PGW2200软交换机RLM计时器信息

Contents

Introduction

本文为发信号模式提供用于Cisco PGW 2200的Redundant Link Manager (RLM)的综述和配置示例。信息在排除也被提供RLM信令和ISDN信令故障在网络接入服务器(NAS)网关和Cisco PGW 2200之间。

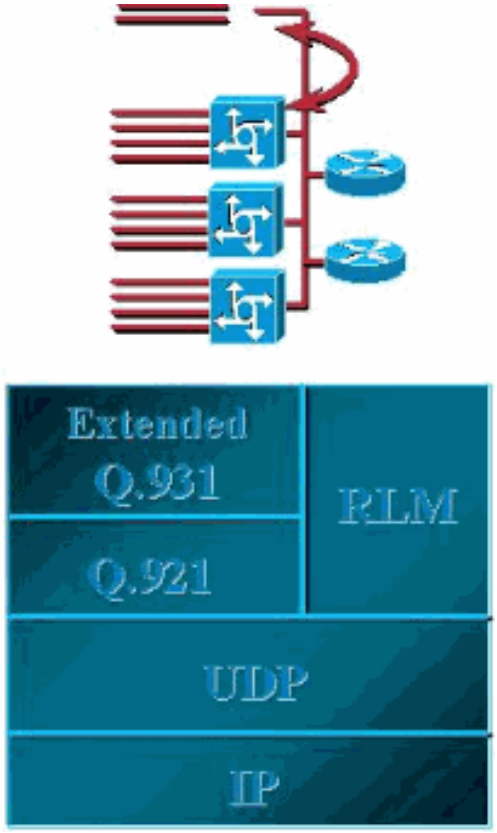
RLM提供在多个IP网络的虚链路管理，以便Cisco Q.931+信令协议可以被传输在多条冗余链路顶部在Cisco PGW 2200和Cisco NAS之间。

RLM提供：

- **客户端/服务器关系**—，当发现时， NAS RLM总是客户端和交换机A链路故障。
- **轮询机制**—周期地发送“Hello”在所有配置的链接保证可用性。
- **保存链路完整性**—控制消息是在同一个IP地址对的被交换的out-of-ban。然而，使用不同的UDP端口。
- 冗余的IP连接。
- 消息安置了服务。
- 可靠性和性能。

图 1：在延长的Q.931和RLM的概述

- **Call control— Extended Q.931** provides call control for setting up and tearing down calls on the media gateway.
- **Link Management - The Redundant Link Manager (RLM)** provides management for multiple IP connections between the PGW2200 and the gateway.



Prerequisites

Requirements

Cisco 建议您了解以下主题：

- 冗余链路管理器
- RLM配置
- Cisco Media Gateway Controller Software Release 9文档

Components Used

本文的信息根据Cisco PGW 2200 Software Release 9.x。

Note: RLM详细资料是Cisco PGW 2200版本7.4(11)和7.4(12)的一部分。然而，本文为Cisco PGW 2200 Release 9.x只提供指南。

The information in this document was created from the devices in a specific lab environment.All of the devices used in this document started with a cleared (default) configuration.If your network is live, make sure that you understand the potential impact of any command.

Conventions

Refer to Cisco Technical Tips Conventions for more information on document conventions.

RLM计时器信息

一个RLM组在网关被配置，并且两Cisco PGW 2200s在RLM组内被配置。一有IP地址，并且活动Cisco PGW 2200和其他的UDP端口有IP地址和暂挂Cisco PGW 2200的UDP端口(请参见图2)。

在RLM组的每个服务器由在不同的UDP端口的两条UDP信道支持。一条UDP信道(端口3000)传输RLM协议和另一条UDP信道(端口3001)传输Q.921协议。

- RLM目标将绝缘从与基于的IP网络典型地产生关联的网络工作情况的不确定的本质的呼叫信令层。RLM维护Cisco PGW 2200和远程NAS之间的多种虚链路和不断地监控链路状态确定流出的帧应该是否假设备选路径。
- 因为每个另外RLM组需要捆绑到Cisco PGW 2200频路控制点(IOCC) (对于其中每一是必需的一个特定UDP端口)，要求多IOCC支持此配置。虽然Cisco PGW 2200可以支持八主速率接口互联网协议(PRIIP) IOCC，其中每一以32个网关(RLM)或每Cisco PGW 2200的IOCC (PRIIP)容量支持32个网关(RLM)。这意味着在Cisco PGW 2200，您有端口3001， 3003和3005至3015。请使用unix命令**netstat - a|**验证此的**grep 30**在Cisco PGW 2200。

信息从XECfgParm.dat文件在目录/opt/CiscoMGC/etc里：

- *.maxNumLinks = 32
- *.maxNumRLMPorts = 8 #唯一RLM端口的最大数量

PGW2200支持最多八个PRI频路控制点进程。当您配置PGW2200时，这些进程被创建。例如，您使用在您的Cisco IOS/PGW2200配置的端口3000和3001， RLM和ISDN。这创建PRI的(NI+)一IOCC。所以，在您使用一个不同的端口时候另一个进程被创建。

每个进程支持32个网关。如果使用每个网关一RLM，则您能有256个网关。但是，当您有四RLMs每个话务路由的时网关，然后您有64个物理网关容量。

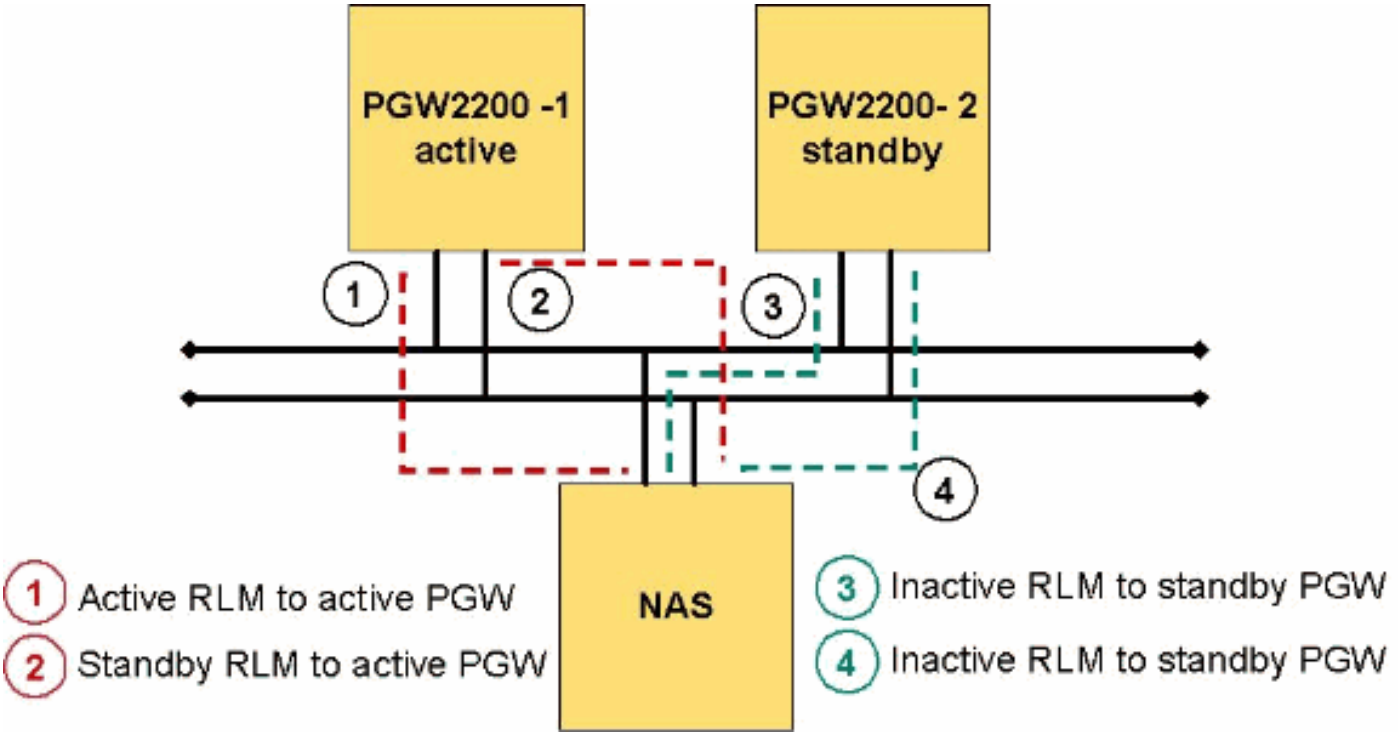
Note: IUA使用从Cisco PGW 2200版本9.4或以上支持。因为RLM有限制根据支持很大数量的NFAS组的比例缩放每个媒体网关， IUA的技术支持与SCTP是有限的。欲知详情参考IUA的技术支持与SCTP。

Note: 请勿更改此值。并且，请注意，当您增加RLM会话您每Cisco PGW 2200使用，越少量总网关您可以支持。例如，一RLM支持总共256个网关每Cisco PGW 2200，两RLMs技术支持总共128个网关每Cisco PGW 2200，等等。

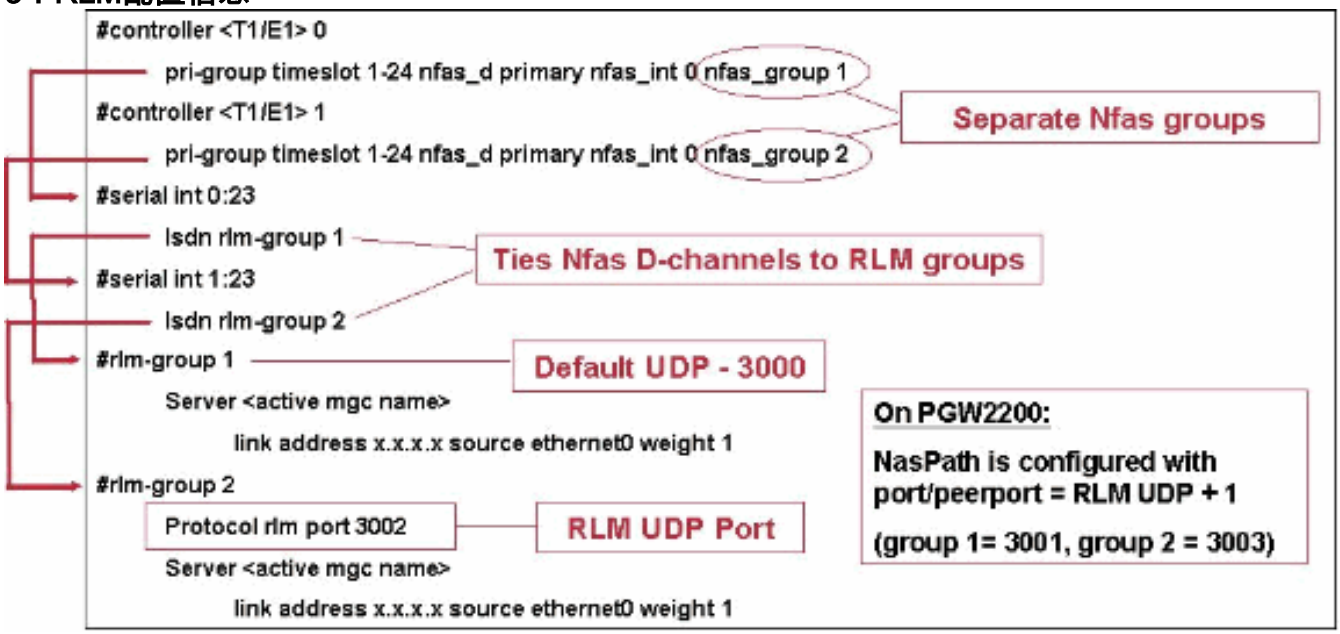
网关认为客户端并且对一个切换的鼓动负责对一条更低的重量暂挂RLM链路的在故障情形下。

概述和验证

图 2：活动/Standby PGW2200/RLM的概念



- RLM管理链路的默认的UDP端口是3000。
- RLM数据链接的默认的UDP端口是一个加上Port值RLM管理链路的UDP的值(例如， 3001)。**图3：RLM配置信息**

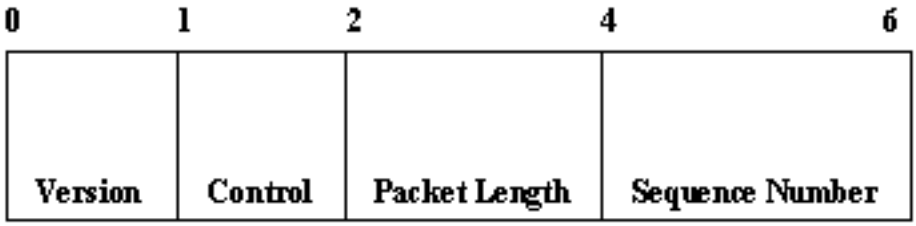


- IOS show rlm group x命令和**显示ip插槽**显示UDP端口在使用中在IOS NAS。
- 在E1/T1控制器的**nfas_int***必须*匹配在Cisco PGW 2200承载信道配置的spanID。这是在信道映射的一个关键点。它在Q.931的ChannelID IE被传输SETUP信息与时隙一起。

RLM如何工作

RLM信息包格式和协议栈

当此图表显示， RLM链路管理信息包包括六个字节。



RLM当前支持的版本在PGW2200的是仅版本2.0。

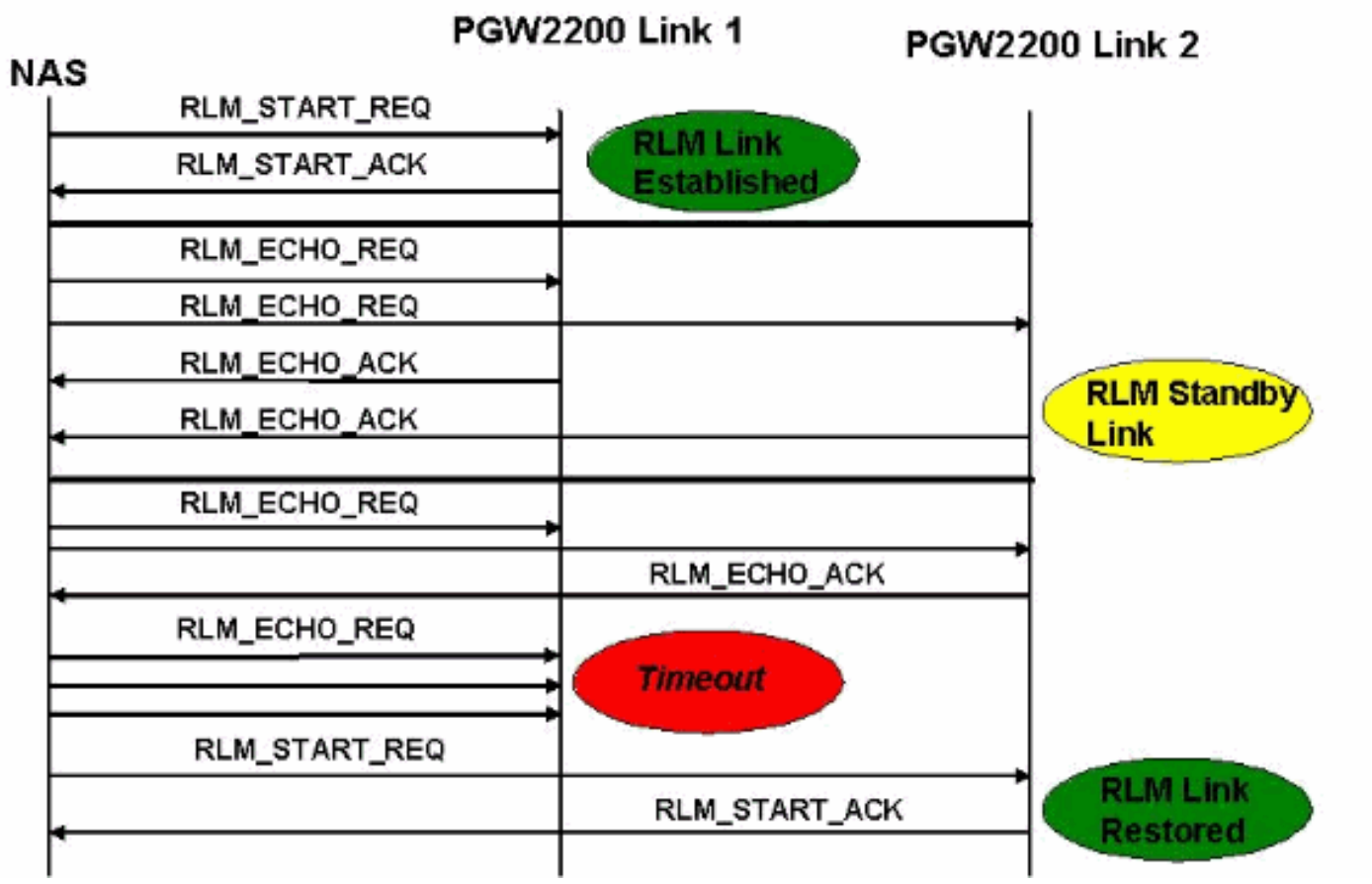
控制字段提供命令给对等体。这些是有效控制值：

- **RLM_START_REQ (0x01)** —用于起动RLM链路。只生成由NAS。
- **RLM_START_ACK (0x02)** —生成由PGW2200承认RLM链路的开始。
- **RLM_STOP_REQ (0x03)** —生成由PGW2200或NAS终止链路。
- **RLM_STOP_ACK (0x04)** —对Stop请求的确认。
- **RLM_ECHO_REQ (0x05)** —用于由NAS周期地只**连接**PGW2200为了验证链路完整性。使用在一个激活链路和所有备用链路。
- **RLM_ECHO_ACK (0x06)** — ECHO请求的确认。
- **RLM_SWITCH_REQ (0x07)** —用于从一条高度被衡量的可用的链路的一条更低的被衡量的活动RLM链路转换。
- **RLM_SWITCH_ACK (0x08)** —交换请求的确认。

信息包长度是RLM管理信息包(UDP有效载荷)的长度。对于RLM版本1.0，此值总是6。对于RLM版本2，此值是8。

序号是用于的一个唯一的价值关联一特定订单请求和确认。

图 4：RLM链路恢复的消息流



在NAS的表4，客户端RLM起动请求到Cisco PGW 2200启动RLM会话。假设配置NAS产生第一条链路更加高优先级。在Cisco PGW 2200承认Start请求后，链路被认为可利用，并且数据包在数据UDP端口可以被发送。第二条链路在一个备用方式安置。RLM周期地发送ECHO请求到在一个特定RLM组的所有被配置的RLM链路。默认间隔是1秒。

关于超时问题在表4，如果激活链路不收到答复到其中一个RLM ECHO请求，它尝试再试请求(DEFAULT值是三个尝试)。在疏忽收到确认，客户端RLM通过发送Start请求起动链路恢复到可用下条高被衡量的备用链路。客户端RLM继续轮询以前激活的链路。如果答复最终被收到，执行一个链路切换回到更高的被衡量的链路。如果链路重量是相同的， RLM客户端选择开始承认首先被接受的链路。对于暂挂Cisco PGW 2200， RLM服务器不承认自NAS的ECHO请求，而在备用状态。一旦暂挂成为激活服务器，并且恢复所有呼叫状态， RLM开始承认请求从NAS。

RLM工作情况是这样RLM Keepalive只传输，当信令数据流有一段时间了时未被传输。例如，信令消息的收据(例如， Q.921)有重置RLM保活计时器效果。也注意RLM Keepalive由NAS只传输。Cisco PGW 2200只回答RLM Keepalive请求。然而，如果RLM保活计时器在Cisco PGW 2200到期，它减少链路。增加在两边的RLM Keepalive计时器值(PGW2200和NAS)保证RLM链路没有被重置在期间默认RLM Keepalive计时器值可能是太严密的IP网络的临时状态期间在。对于单个Cisco PGW 2200，没有执行的此补偿。使用在故障切换配置的两Cisco PGW 2200s，有在避免飘荡在RLM链路和快速发现链路故障之间的一个折衷方案。使用RLM、保活计时器和增加的Q.921/Q.931计时器。

当您查看控制RLM信息消息(时请参见图5)，控制字段提供命令给对等体。值在表5是有效控制值：

图 5：RLM消息信息

- ***RLM_START_REQ:*** Used by NAS to initiate an RLM link.
- ***RLM_START_ACK:*** Generated by the Cisco PGW2200 to acknowledge the start of an RLM link.
- ***RLM_STOP_REQ:*** Generated by either CiscoPGW2200 or NAS to stop a link.
- ***RLM_STOP_ACK:*** Acknowledgement to a stop request.
- ***RLM_ECHO_REQ:*** Used by the NAS to periodically "ping" the Cisco PGW2200 in order to verify link integrity. Used both on the active link and all standby links. By default it's sent every second if there is no other traffic. Used also by the Cisco PGW2200 at switchover
- ***RLM_ECHO_ACK:*** Acknowledgement to an echo request.
- ***RLM_SWITCH_REQ:*** Used by NAS to switch from a lower weighted active RLM link to a higher weighted available link.
- ***RLM_SWITCH_ACK:*** Acknowledgement to a switch request.

更换在NAS和Cisco PGW 2200的RLM计时器

此部分设计保留稳定的呼叫在Cisco PGW 2200故障切换期间或在瞬变IP网络不稳定性的情况下。这些更改保证呼叫保留，除非有RLM连接长时期的损失。RLM连接损失意味着没有运载可用的链路NAS和活动Cisco PGW 2200之间的信令数据流。单条链路的损失由RLM层处理透明地对ISDN堆栈。

用**show rlm group <x>命令**在IOS NAS，您能检查RLM的计时器。

表1 ：RLM在Cisco IOS NAS的默认计时器值

计时器	持续时间
打开等待	3秒
恢复	12秒
最小数量	60秒
Keepalive	1秒
Force-down	30秒
交换机链路	5秒
重新传输	1秒

- force-down时间比总Keepalive时间(保活周期需要长*重试次数)加上恢复时间。例如，请参阅此公式：force-down > (Keepalive *重试次数) +恢复默认情况下重试次数= 3次此示例， 30 > (1 * 3) + 12如果force-down和保活计时器有同一值，则IOS NAS不能认为重置链路，因为Keepalive是大于或等于强制停工期。
- **保活计时器**— IOS NAS发送ECHO_REQ每1秒。在三丢失ECHO_REQ后， NAS认为链路也许发生故障，并且启动恢复计时器(12秒)。然而，它继续发送预计的ECHO_REQ链路也许恢复。注意此在更旧的Cisco IOS版本，恢复计时器在默认值是太长的。有RLM链路可能被中断的实例。最佳的项目是检查在两个系统的这些计时器。在暂挂Cisco PGW 2200的启动/关闭期间，活动Cisco PGW 2200在其对ECHO_REQ的回应被延迟从IOS NAS。在从IOS NAS的三个尝试，其中每一与一秒钟超时默认值， IOS NAS减少RLM链路后。通过增加保活计时器从1秒到10秒，保持活动RLM是可能的。这样， IOS NAS在每ECHO_REQ以后长期等待在计时和再试一次前。使用10秒Keepalive， IOS NAS能在计时和带来等30秒在RLM链路下前。然而，在此实例中，如果更换保活计时器，您需要采取在force-down计时器的注意。
- **恢复计时器**—如果要降低恢复计时器，请迅速减少活动RLM链路，在Cisco PGW 2200重新启动前。这由配置保活计时器和force-down计时器完成按同一值。所以，当IOS NAS被重新载入并且回来时，远程IOS NAS不能认为重置链路，因为Keepalive是大于或等于force-down时间。force-down时间比总Keepalive时间(保活周期需要极大*重试次数)加上恢复时间。更正是force-down计时器必须是更加了不起的然后三倍Keepalive加上恢复计时器。
- **Force-down计时器**—根据规格， RLM在恢复状态保持大约15秒(ECHO_REQ的编号每1秒加上恢复每12秒)。如果链路不在该时间段内回来， RLM状态去故障状态和被迫坚持下来在30秒作为默认值避免乒乓切换技术效果。在那以后，它开始派出Keepalive。两客户端和服务器同时通过此循环。当RLM状态从IDLE去到DOWN时，没有需要迫使状态下来，因为已经在故障状态。这意味着，当以太网/快速以太网链路是断开的时， IOS的NAS RLM客户端设法恢复链路恢复计时器定义的周期(DEFAULT值等于12秒)。如果它不是成功的，有防止RLM客户端回应的force-down计时器(DEFAULT值等于30秒)，即使以太网链路是UP。在force-down计时器到期之后， RLM客户端开始建立链路用Cisco PGW 2200。在这种情况下您能有42秒(恢复和force-down计时器的组合延迟[12 + 30 = 42秒])。**表2 ：**RLM在Cisco PGW 2200 properties.dat值的计时器值。[*]是在9.3(2) Cisco PGW 2200版本被删除的属性值。**Note:** 当您修改计时器时，在Cisco PGW 2200和NAS之间的配错的计时器可以是难诊断。所以，作为一件可操作的事情，建议使用默认设置，除非有强制原因更改他们。

ISDN Q.921和Q.931+

要求PGW2200提供ISDN在冗余的IP链路的Q.921和NI-2 Q.931连接的多种远程Cisco NAS网关。这

些冗余的IP链路由RLM维护。因此，在Time Division Multiplexing (TDM)接口(IMT Trunk)的所有时隙该运行到NAS里包含仅承载信道。ISDN信令在从PGW2200的IP链路间被传送的NAS网关。每信令连接包括一个对PGW2200和NAS之间的冗余的IP链路。可以有在每一个或更多信令连接NAS。每信令连接完全控制一套NAS TDM接口作为无设施随路(NFAS)组。

使用传统ISDN信令，每条ISDN PRI电路有(D信道)用于的一个时隙传送信令。然而，与ISDN NFAS PRI，信令在所有PRI接口的单个D信道被传送在NFAS组。这减少为了PRI线路和产量额外的承载信道需要的信令链路的数量能将用于数据、语音或者视频。如果主要接口是在服务范围外，它是可选的有在另一个接口的备份的D信道。在思科的SS7接入服务器和语音网关的互连解决方案，使用ISDN NFAS功能。然而，与SS7实施， ISDN信令信道(D信道)从PRI接口释放并且重定向对另一个端口(以太网、快速以太网或者序列)。所以，所有PRI时隙不包含承载信道和仅信令。

某些增加的特征增进被做对NI-2协议是：

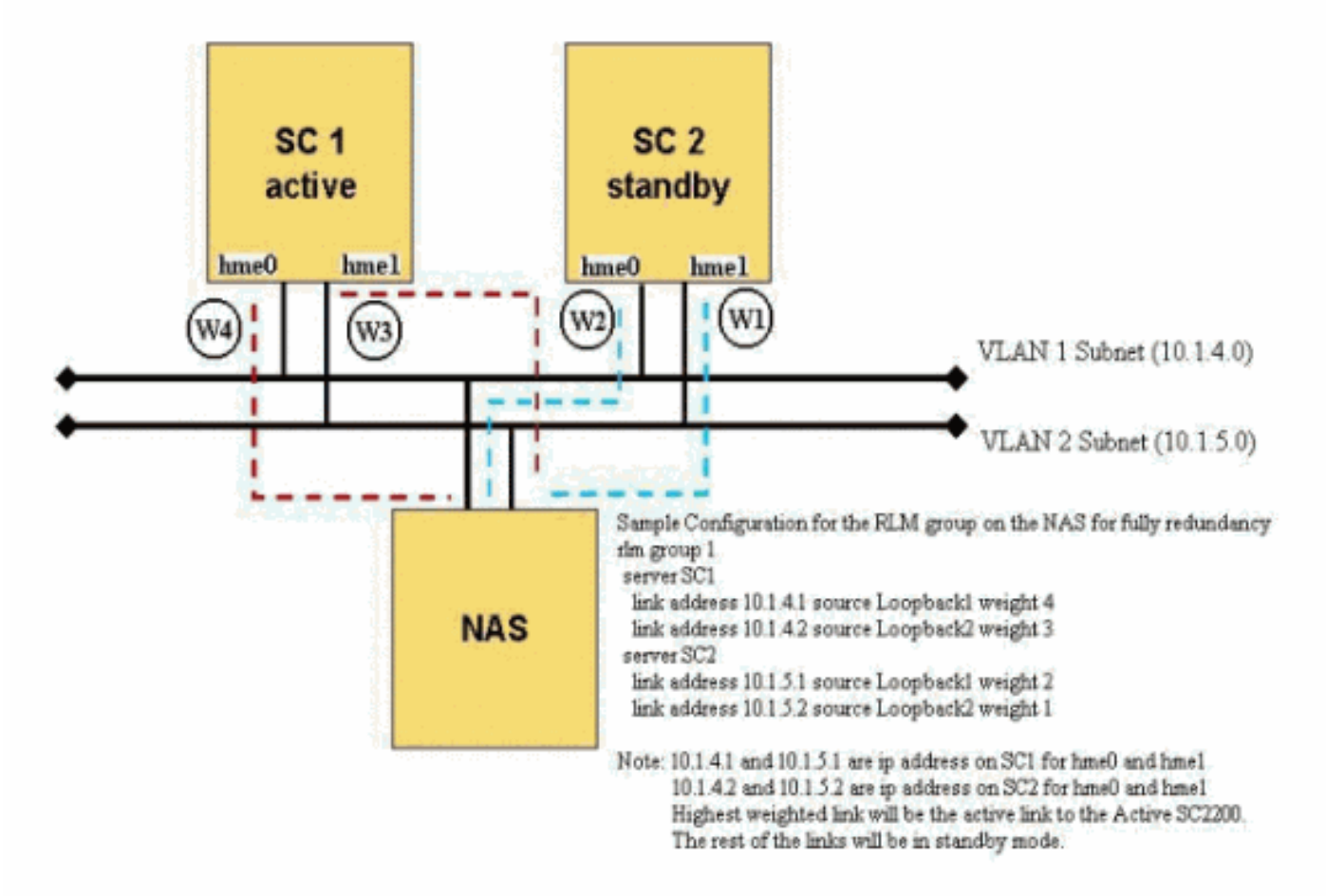
- SS7 Continuity Test (COT)
- **单个信道服务消息**—报告服务状态(是或OOS)单个承载信道的。
- **组服务消息**—报告所有承载信道的服务状态一个或更多T1/E1接口的。
- **同步和再同时**— Checkpoint在PGW2200和NAS网关之间的呼叫状态。这些消息典型地生成，在事件的一台交换机确定后任何差误是否在呼叫状态发生了。

Configure

本部分提供了用于配置本文档所述功能的信息。

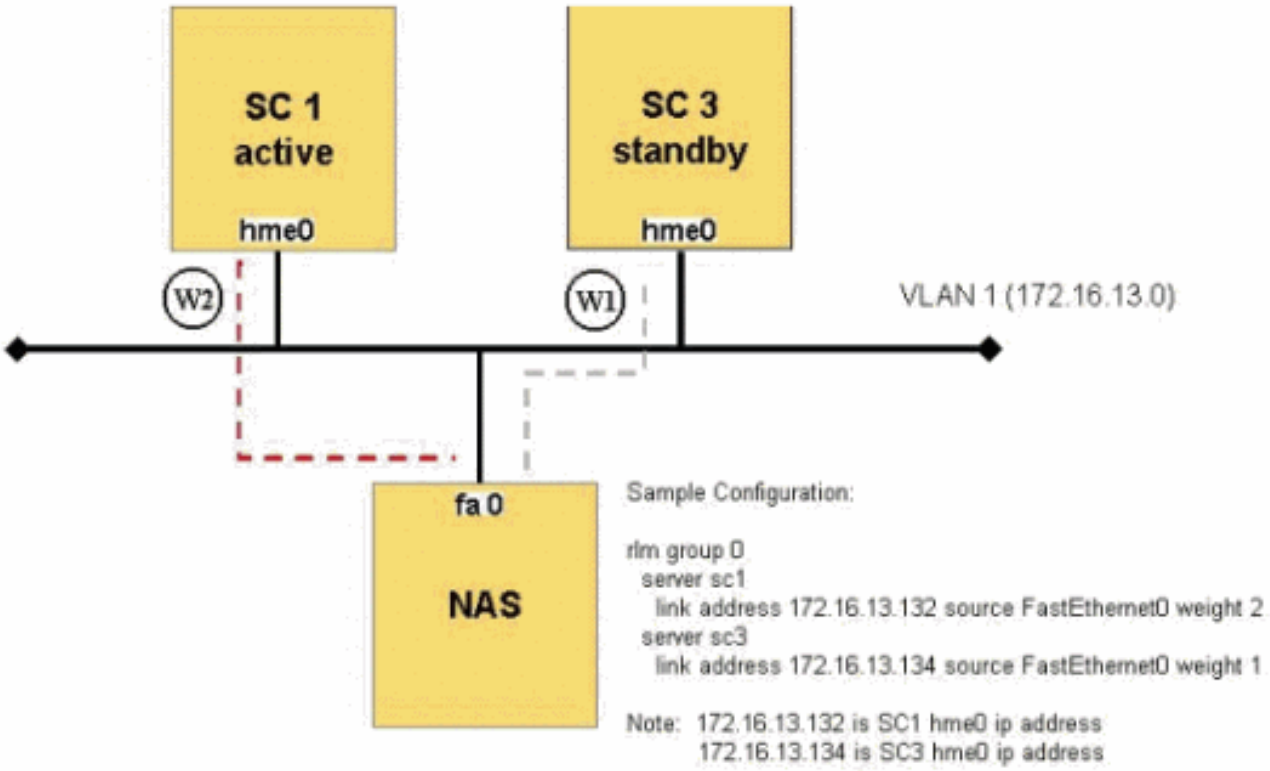
Note: 使用命令查找工具（仅限注册用户）可查找有关本文档所用命令的其他信息。

在NAS网关的配置是简单的。每个NAS网关有被定义的一个或更多RLM组。在RLM组内，和，如果PGW2200在冗余模式，有两服务器链路(第一组活动PGW2200和另一个的暂挂PGW2200的)。每个服务器链路组能有连接到其中每一个PGW2200以太网的一两条链路(E0和E1)接口。NAS网关能使用其接口(环回、以太网或者快速以太网)之一作为源地址创建PGW2200的链路。对于全面冗余，NAS网关连接两个以太网接口到两PGW 2200s。一以太网连接到两PGW2200 hme0在一个VLAN的接口。另一个以太网接口连接到两PGW2200 hme1在另一个VLAN的接口。请参阅此图表关于充分的冗余设置。



Network Diagram

本文档使用以下网络设置：



配置

关于关于如何的逐步指令组成RLM组与与PGW2200谈，请参见配置SS7互连的媒体网关语音网关解决方案和Redundant Link Manager (RLM)的。

本文不包括关于如何的逐步指令设置SS7互连的PGW2200。请参见这些文档详细信息：

- Cisco Media Gateway Controller Release 7文档
- 语音网关解决方案的Cisco SS7互连，版本1.1
- Cisco MGC Software Release 7安装&配置指南
- Cisco MGC Release 7设置的指南

反而，本文集中区域与NAS设置的和验证和故障排除有关从PGW2200方面。

这是为NAS网关设置的配置示例。注意我们的实验室设置不充分地冗余。NAS网关只有一条信令链路被定义对其中每一PGW 2200s。

在NAS的PGW2200

```
isdn switch-type primary-ni
!--- Define the switch-type to use. !--- For SS7, this
must be primary-ni.

!
controller T1 0
 framing esf
 clock source line primary
 linecode b8zs
pri-group timeslots 1-24 nfas_d primary nfas_int 0
nfas_group 0
!--- Configure the NFAS group 0. ! interface Serial0:23
no ip address encapsulation ppp isdn switch-type
primary-ni
!--- Define the switch-type to use. !--- For SS7, this
must be primary-ni.

isdn incoming-voice modem
isdn rlm-group 0
!--- Bind the RLM group 0 to the D-channel. !--- This
causes the ISDN signaling to go over IP instead of the
TDM D-channel. no isdn send-status-enquiry !---
Timeslot24. isdn negotiate-bchan resend-setup isdn
bchan-number-order ascending ! interface FastEthernet0
ip address 172.16.13.141 255.255.255.224 duplex auto
speed auto ! rlm group 0
!--- Define the RLM group parameters to talk with the
PGW 2200. server sc1
!--- Specify the first PGW 2200 and IP addresses used to
setup the link. link address 172.16.13.132 source
FastEthernet0 weight 2
server sc3
!--- Specify the first PGW 2200 and IP addresses used to
setup the link. LINK ADDRESS 172.16.13.134 SOURCE
FASTETHERNET0 WEIGHT 1 !
```

Verify

本部分提供的信息可帮助您确认您的配置是否可正常运行。

命令输出解释程序工具（仅限注册用户）支持某些 **show** 命令，使用此工具可以查看对 show 命令输出的分析。

- **show rlm group** —验证RLM组是正在运行的在NAS网关。
- **show isdn status** —验证ISDN信令在NAS网关适当地运作。
- **show controller t1** —验证所有控制器T1/E1s是正在运行的清洗在NAS网关。
- **show isdn service** —验证所有承载信道在使用中在NAS网关的。
- **rtrv-ne** —验证PGW2200是上和活跃的。
- **rtrvsoftw** ：**全**验证所有软件进程在PGW2200运行。
- **rtrv-sc** ：**全**验证所有信令链路在使用中在PGW2200的。
- **rtrv DEST** ：**全**验证所有目的地链路在使用中在PGW2200的。
- **rtrv-tc** ：**全**验证所有CICs从SS7和NAS网关是上和空闲透视图。

检查在NAS网关的这些项目：

- 切记使用**show rlm group命令**， RLM组启用并且运作。
- 使用**show isdn status命令**，适当地确定ISDN信令工作。
- 确定使用**show controller t1命令**，所有控制器T1/E1s是正在运行的清洗。
- 确定使用**show isdn service命令**，所有承载信道在使用中。

检查在PGW2200的这些项目：

- 确定系统使用mml命令的**rtrv-ne**启用和活跃的。
- 确定使用**rtrvsoftw**，所有软件进程运行：**所有**mml命令。
- 确定使用**rtrv-sc**，所有信令链路在使用中：**所有**mml命令。
- 确定使用rtrv **DEST**，所有目的地链路在使用中：**所有**mml命令。
- 确定所有CICs是从SS7和NAS网关的上和IDLE透视图使用**rtrv-tc** ：**所有**mml命令。

这是从与PGW2200联络没有错误的NAS网关的示例命令输出。

```
NAS1#show rlm group 0
RLM Group 0 Status
User/Port: RLM_MGR/3000 ISDN/3001
!--- UDP port used to communicate to the PGW 2200. RLM Version : 2 Link State: Up   Last Link
Status Reported: Up
!--- RLM is up and running. Next tx TID: 1 Last rx TID: 0 Server Link Group[sc1]: Last Reported
Priority: HIGH link [172.16.13.141(FastEthernet0), 172.16.13.132] = socket[active]
!--- Link to the active PGW 2200. Server Link Group[sc3]: Last Reported Priority: LOW link
[172.16.13.141(FastEthernet0), 172.16.13.134] = socket[standby]
!--- Link to the standby PGW 2200. RLM Group 0 Timer Values open_wait = 3s force-down = 30s
recovery = 12s switch-link = 5s minimum-up = 60s retransmit = 1s keepalive  = 1s
!--- Timer for the echo sent and received. RLM Group 0 Statistics Link_up: last time occurred at
*Jan 14 10:27:23.531, total transition=1 avg=00:00:00.000, max=00:00:00.000, min=00:00:00.000,
latest=00:00:00.000 Link_down: last time occurred at *Jan 14 10:26:47.531, total transition=1
avg=00:00:36.000, max=00:00:36.000, min=00:00:00.000, latest=00:00:36.000 Link_recovered: last
time occurred at none, success=0(0%), failure=0 avg=0.000s, max=0.000s, min=0.000s,
latest=0.000s Link_switched: last time occurred at none, success=0(0%), failure=0 avg=0.000s,
max=0.000s, min=0.000s, latest=0.000s Server_changed: last time occurred at none for totally 0
times Server Link Group[sc1]: Open the link [172.16.13.141(FastEthernet0), 172.16.13.132]: last
time occurred at *Jan 14 10:27:17.531, success=1(100%), failure=0 avg=3.000s, max=3.000s,
min=0.000s, latest=3.000s Echo over link [172.16.13.141(FastEthernet0), 172.16.13.132]: last
time occurred at *Jan 14 10:30:51.531, success=204(99%), failure=1 avg=0.000s, max=0.004s,
min=0.000s, latest=0.000s Server Link Group[sc3]: Open the link [172.16.13.141(FastEthernet0),
172.16.13.134]: last time occurred at *Jan 14 10:27:17.531, success=1(100%), failure=0
avg=3.000s, max=3.000s, min=0.000s, latest=3.000s Echo over link [172.16.13.141(FastEthernet0),
```

```
172.16.13.134]: last time occurred at *Jan 14 10:30:51.531, success=212(99%), failure=1
avg=0.000s, max=0.000s, min=0.000s, latest=0.000s
```

此列表为RLM计时器提供解释。

- **open_wait = 3s** —等待连接请求是acked。
- **force-down = 30s** —强制RLM的最短时间坚持在故障状态确定远程终端发现链路状态发生故障。
- **= 12s** —时候允许链路恢复到备份链路，在您宣称链路下来前。
- **= 5s** —时候发现链路交换机故障。
- **= 60s** —稳定最近被恢复的更高的首选链路的最短时间在交换前。
- **= 1** — UDP每RLM的重新传输计时器Request信息在请求前是acked。
- **Keepalive = 1** —被发送和接收的响应的计时器。

```
NAS1#show isdn stat
Global ISDN Switchtype = primary-ni
ISDN Serial0:23 interface  rlm-group = 0
!--- D-channel bind to rlm-group 0. dsl 0, interface ISDN Switchtype = primary-ni : Primary D-
channel of nfas group 0 Layer 1 Status: ACTIVE Layer 2 Status: TEI = 0, Ces = 1, SAPI = 0, State
= MULTIPLE_FRAME_ESTABLISHED
!--- Good. Layer 3 Status: 0 Active Layer 3 Call(s) Active dsl 0 CCBs = 0 The Free Channel Mask:
0x80FFFFFF Total Allocated ISDN CCBs = 0 NAS1#show isdn service
PRI Channel Statistics:
ISDN Se0:23 SC, Channel [1-24]
!--- Note the keyword PGW 2200. In normal ISDN, it is not there. Configured Isdn Interface (dsl)
0 Channel State (0=Idle 1=Proposed 2=Busy 3=Reserved 4=Restart 5=Maint_Pend) Channel : 1 2 3 4 5
6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 State : 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
!--- All timeslots are good and idle including timeslot 24. Service State (0=Inservice 1=Maint
2=Outofservice) Channel : 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 State : 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
NAS1#
NAS1#show controller t1
T1 0 is up.
!--- T1 is up and running clean with no errors. Applique type is Channelized T1 Cablelength is
short 133 No alarms detected. alarm-trigger is not set Version info of slot 0: HW: 4, PLD Rev: 0
Manufacture Cookie Info: EEPROM Type 0x0001, EEPROM Version 0x01, Board ID 0x42, Board Hardware
Version 1.32, Item Number 73-2217-05, Board Revision B16, Serial Number 10077744, PLD/ISP
Version 0.0, Manufacture Date 25-Sep-1998. Framing is ESF, Line Code is B8ZS, Clock Source is
Line Primary.
!--- T1 physical layer configuration. Data in current interval (429 seconds elapsed): 0 Line
Code Violations, 0 Path Code Violations 0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded
Mins 0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs Total Data (last 3
15 minute intervals): 0 Line Code Violations, 0 Path Code Violations, 0 Slip Secs, 0 Fr Loss
Secs, 0 Line Err Secs, 0 Degraded Mins, 0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs,
0 Unavail Secs
```

这是PGW2200的example命令输出。它选派项目检查在验证时。

```
sc1 mml>rtrv-ne
   MGC-01 - Media Gateway Controller 2002-01-14 11:47:24
M  RTRV
   "Type:MGC"
   "Hardware platform:sun4u sparc SUNW,Ultra-60"
   "Vendor:"Cisco Systems, Inc.""
   "Location:MGC-01 - Media Gateway Controller"
   "Version:"7.4(11)"
!--- MGC software version running on PGW 2200. "Platform State:ACTIVE" !--- State of the PGW
2200. ; sc1 mml>rtrv-softw:all
!--- Make sure all the processes are active and running. MGC-01 - Media Gateway Controller 2002-
01-14 11:47:29 M RTRV "CFM-01:RUNNING ACTIVE" "ALM-01:RUNNING ACTIVE" "MM-01:RUNNING ACTIVE"
"AMDMPR-01:RUNNING ACTIVE" "CDRDMPR-01:RUNNING ACTIVE" "DSKM-01:RUNNING IN N/A STATE" "MMDB-
```

```
01:RUNNING IN N/A STATE" "POM-01:RUNNING ACTIVE" "MEASAGT:RUNNING ACTIVE" "OPERSAGT:RUNNING
ACTIVE" "PROVSAGT:RUNNING ACTIVE" "priip-1:RUNNING IN N/A STATE" "Replic-01:RUNNING ACTIVE"
"ENG-01:RUNNING ACTIVE" "IOCM-01:RUNNING ACTIVE" "TCAP-01:RUNNING IN N/A STATE" "ss7-a-1:RUNNING
IN N/A STATE" "FOD-01:RUNNING IN N/A STATE" "LOG-01:RUNNING IN N/A STATE" ; sc1 mml>rtrv-sc:all
   MGC-01 - Media Gateway Controller 2002-01-14 11:47:36
M  RTRV
   "gw1link1:signas1,LID=0:IS"
    !--- IP signaling link from the NAS to PGW 2200 (rlm group) !--- LID=0:IS means the RLM is
up. /* Link1 between gw1 and the sc2200-1 */ "ls1-link1:ls1,LID=0:IS"
!--- IP signaling link from the SLT to the PGW 2200 (C7IPLINK). /* Link1 for ls1 */ ; sc1
mml>rtrv-dest:all
   MGC-01 - Media Gateway Controller 2002-01-14 11:47:39
M  RTRV
   "dpc-sc2200:PKG=SS7-ANSI,ASSOC=signas1,PST=IS,SST=RSTO"
    !--- SS7 signal to the destination point code (DPC). "signas1:PKG=ISDNPRI,ASSOC=dpc-
sc2200,PST=IS,SST=RSTO"
!--- ISDN signaling between the NAS and the PGW 2200 !--- (same as show isdn status on NAS).

   ;

sc1 mml>rtrv-tc:all
   Retrieving results.  This could take a few moments...
   MGC-01 - Media Gateway Controller 2002-01-14 11:47:46
M  RTRV
   "dpc-sc2200:CIC=1,PST=IS,CALL=IDLE,BLK=NONE"
!--- InterMachine Trunk (IMT) status on SS7 side toward the DPC switch. "dpc-
sc2200:CIC=2,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=3,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=4,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=5,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=6,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=7,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=8,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=9,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=10,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=11,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=12,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=13,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=14,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=15,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=16,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=17,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=18,PST=IS,CALL=IDLE,BLK=NONE" <Press Enter to continue OR Press * and Enter to quit
output of command> "dpc-sc2200:CIC=19,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=20,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=21,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=22,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=23,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=24,PST=IS,CALL=IDLE,BLK=NONE" "signas1:TC=1,CALL=IDLE,PST=IS,SPAN=0" !---
Corresponding T1 timeslots on the NAS gateway side to the SC !--- (same as show isdn service on
NAS) CALL= specify the direction of the call !--- SPAN=0 specify the nfas_int.

"signas1:TC=2,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=3,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=4,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=5,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=6,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=7,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=8,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=9,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=10,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=11,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=12,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=13,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=14,CALL=IDLE,PST=IS,SPAN=0"

<Press Enter to continue OR Press * and Enter to quit output of command>
   "signas1:TC=15,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=16,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=17,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=18,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=19,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=20,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=21,CALL=IDLE,PST=IS,SPAN=0"
```

```
   "signas1:TC=22,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=23,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=24,CALL=IDLE,PST=IS,SPAN=0"

sc1 mml>prov-rtrv:all
!--- Retrieved the current configuration on the PGW 2200. MGC-01 - Media Gateway Controller
2002-01-15 09:25:12 M RTRV "session=active:all" /* NAME COMPID Parent Name TID Description ----
-------- ----------- --- ----------- "sc1-card1" 00050001 "mgc-01" CARD "1st Ethernet card in
sc2200-1" "en1" 00060001 "sc1-card1" ENETIF "Interface for 1st ethernet card in sc2200-1" "ls1"
00080001 "dpc-sc2200" LNKSET "Link set from sc2200-2 to sc2200-1" "gw1link1"    00100001
"signas1"      IPLNK       "Link1 between gw1 and the sc2200-1"
"route1"      00110001  "mgc-01"       SS7ROUTE    "route for ls1"
"opc-sc2200"  00130001  "mgc-01"       PTCODE      "Own point code for SC2200-1"
"dpc-sc2200"  00130002  "mgc-01"       PTCODE      "dest point code sc2200-2"
"SIGNAS1"     00140001  "GW1"          NASPATH     "SIGNALING SERVICE TO GW1"
"ss7srv"      00150001  "dpc-sc2200"   SS7PATH     "SS7 service to switch-va"
"gw1"         00160001  "mgc-01"       EXTNODE     "Gateway 1 connected to switch-va"
"ls1-link1"   001d0001  "ls1"          C7IPLNK     "Link1 for ls1"
   */
   ;
sc1 mml>prov-rtrv:NASPATH:name="signas1"
   MGC-01 - Media Gateway Controller 2002-01-15 09:25:27
M  RTRV
"SESSION=ACTIVE:NASPATH"
   /*
NAME = signas1
DESC = Signaling service to gw1
EXTNODE = gw1
MDO = BELL_1268_C3
   */
   ;
 !--- In PGW release 9.3(2) and later, the BELL_1268_C3 variant !--- is changed to BELL_1268_C2.
prov-add:NASPATH:NAME="signas1",DESC="Signaling Service to V5300-1",EXTNODE="v5300-
1",MDO="BELL_1268_C2",CUSTGRPID="0000" sc1 mml>prov-rtrv:IPLNK:name="gw1link1"
 !--- Get detail information on the IP link to the PGW 2200. MGC-01 - Media Gateway Controller
2002-01-15 09:25:49 M RTRV "SESSION=ACTIVE:IPLNK" /* NAME = gw1link1 DESC = Link1 between gw1
and the sc2200-1 SVC = signas1 IF = en1 !--- Use Ethernet interface by sc1-card1 !--- which is
bound to the hme0 interface.

IPADDR = IP_Addr1
!--- IP_Addr1(172.16.13.132) defined in the XECfgParm.dat. PORT = 3001 !--- UDP port used for
the ISDN signaling. PEERADDR = 172.16.13.141 !--- IP address of the NAS gateway. PEERPORT = 3001
!--- UDP port to be used on the NAS gateway for ISDN signaling. PRI = 1 !--- Priority level
defined for the IP link. SIGSLOT = 0 SIGPORT = 0 NEXTHOP = 0.0.0.0 NETMASK = 255.255.255.255 */
; sc1 mml>
```

您能也验证在位于/opt/CiscoMGC/etc目录的.dat文件的此同样信息。.dat文件是从配置和设置PGW2200收集的信息。sigChanDevIp.dat文件包含关于IP链路的所有信息的从NAS网关和SLT的PGW2200。

```
sc1 mml>rtrv-ne
   MGC-01 - Media Gateway Controller 2002-01-14 11:47:24
M  RTRV
   "Type:MGC"
   "Hardware platform:sun4u sparc SUNW,Ultra-60"
   "Vendor:"Cisco Systems, Inc.""
   "Location:MGC-01 - Media Gateway Controller"
   "Version:"7.4(11)"
!--- MGC software version running on PGW 2200. "Platform State:ACTIVE" !--- State of the PGW
2200. ; sc1 mml>rtrv-softw:all
!--- Make sure all the processes are active and running. MGC-01 - Media Gateway Controller 2002-
01-14 11:47:29 M RTRV "CFM-01:RUNNING ACTIVE" "ALM-01:RUNNING ACTIVE" "MM-01:RUNNING ACTIVE"
"AMDMPR-01:RUNNING ACTIVE" "CDRDMPR-01:RUNNING ACTIVE" "DSKM-01:RUNNING IN N/A STATE" "MMDB-
```

```
01:RUNNING IN N/A STATE" "POM-01:RUNNING ACTIVE" "MEASAGT:RUNNING ACTIVE" "OPERSAGT:RUNNING
ACTIVE" "PROVSAGT:RUNNING ACTIVE" "priip-1:RUNNING IN N/A STATE" "Replic-01:RUNNING ACTIVE"
"ENG-01:RUNNING ACTIVE" "IOCM-01:RUNNING ACTIVE" "TCAP-01:RUNNING IN N/A STATE" "ss7-a-1:RUNNING
IN N/A STATE" "FOD-01:RUNNING IN N/A STATE" "LOG-01:RUNNING IN N/A STATE" ; sc1 mml>rtrv-sc:all
   MGC-01 - Media Gateway Controller 2002-01-14 11:47:36
M  RTRV
   "gw1link1:signas1,LID=0:IS"
    !--- IP signaling link from the NAS to PGW 2200 (rlm group) !--- LID=0:IS means the RLM is
up. /* Link1 between gw1 and the sc2200-1 */ "ls1-link1:ls1,LID=0:IS"
!--- IP signaling link from the SLT to the PGW 2200 (C7IPLINK). /* Link1 for ls1 */ ; sc1
mml>rtrv-dest:all
   MGC-01 - Media Gateway Controller 2002-01-14 11:47:39
M  RTRV
   "dpc-sc2200:PKG=SS7-ANSI,ASSOC=signas1,PST=IS,SST=RSTO"
    !--- SS7 signal to the destination point code (DPC). "signas1:PKG=ISDNPRI,ASSOC=dpc-
sc2200,PST=IS,SST=RSTO"
!--- ISDN signaling between the NAS and the PGW 2200 !--- (same as show isdn status on NAS).

   ;

sc1 mml>rtrv-tc:all
   Retrieving results.  This could take a few moments...
   MGC-01 - Media Gateway Controller 2002-01-14 11:47:46
M  RTRV
   "dpc-sc2200:CIC=1,PST=IS,CALL=IDLE,BLK=NONE"
!--- InterMachine Trunk (IMT) status on SS7 side toward the DPC switch. "dpc-
sc2200:CIC=2,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=3,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=4,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=5,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=6,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=7,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=8,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=9,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=10,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=11,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=12,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=13,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=14,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=15,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=16,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=17,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=18,PST=IS,CALL=IDLE,BLK=NONE" <Press Enter to continue OR Press * and Enter to quit
output of command> "dpc-sc2200:CIC=19,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=20,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=21,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=22,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=23,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=24,PST=IS,CALL=IDLE,BLK=NONE" "signas1:TC=1,CALL=IDLE,PST=IS,SPAN=0" !---
Corresponding T1 timeslots on the NAS gateway side to the SC !--- (same as show isdn service on
NAS) CALL= specify the direction of the call !--- SPAN=0 specify the nfas_int.

"signas1:TC=2,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=3,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=4,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=5,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=6,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=7,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=8,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=9,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=10,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=11,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=12,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=13,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=14,CALL=IDLE,PST=IS,SPAN=0"

<Press Enter to continue OR Press * and Enter to quit output of command>
   "signas1:TC=15,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=16,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=17,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=18,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=19,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=20,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=21,CALL=IDLE,PST=IS,SPAN=0"
```

```
   "signas1:TC=22,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=23,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=24,CALL=IDLE,PST=IS,SPAN=0"

sc1 mml>prov-rtrv:all
!--- Retrieved the current configuration on the PGW 2200. MGC-01 - Media Gateway Controller
2002-01-15 09:25:12 M RTRV "session=active:all" /* NAME COMPID Parent Name TID Description ----
-------- ----------- --- ----------- "sc1-card1" 00050001 "mgc-01" CARD "1st Ethernet card in
sc2200-1" "en1" 00060001 "sc1-card1" ENETIF "Interface for 1st ethernet card in sc2200-1" "ls1"
00080001 "dpc-sc2200" LNKSET "Link set from sc2200-2 to sc2200-1" "gw1link1"    00100001
"signas1"      IPLNK       "Link1 between gw1 and the sc2200-1"
"route1"      00110001  "mgc-01"       SS7ROUTE    "route for ls1"
"opc-sc2200"  00130001  "mgc-01"       PTCODE      "Own point code for SC2200-1"
"dpc-sc2200"  00130002  "mgc-01"       PTCODE      "dest point code sc2200-2"
"SIGNAS1"     00140001  "GW1"          NASPATH     "SIGNALING SERVICE TO GW1"
"ss7srv"      00150001  "dpc-sc2200"   SS7PATH     "SS7 service to switch-va"
"gw1"         00160001  "mgc-01"       EXTNODE     "Gateway 1 connected to switch-va"
"ls1-link1"   001d0001  "ls1"          C7IPLNK     "Link1 for ls1"
   */
   ;
sc1 mml>prov-rtrv:NASPATH:name="signas1"
   MGC-01 - Media Gateway Controller 2002-01-15 09:25:27
M  RTRV
"SESSION=ACTIVE:NASPATH"
   /*
NAME = signas1
DESC = Signaling service to gw1
EXTNODE = gw1
MDO = BELL_1268_C3
   */
   ;
 !--- In PGW release 9.3(2) and later, the BELL_1268_C3 variant !--- is changed to BELL_1268_C2.
prov-add:NASPATH:NAME="signas1",DESC="Signaling Service to V5300-1",EXTNODE="v5300-
1",MDO="BELL_1268_C2",CUSTGRPID="0000" sc1 mml>prov-rtrv:IPLNK:name="gw1link1"
 !--- Get detail information on the IP link to the PGW 2200. MGC-01 - Media Gateway Controller
2002-01-15 09:25:49 M RTRV "SESSION=ACTIVE:IPLNK" /* NAME = gw1link1 DESC = Link1 between gw1
and the sc2200-1 SVC = signas1 IF = en1 !--- Use Ethernet interface by sc1-card1 !--- which is
bound to the hme0 interface.

IPADDR = IP_Addr1
!--- IP_Addr1(172.16.13.132) defined in the XECfgParm.dat. PORT = 3001 !--- UDP port used for
the ISDN signaling. PEERADDR = 172.16.13.141 !--- IP address of the NAS gateway. PEERPORT = 3001
!--- UDP port to be used on the NAS gateway for ISDN signaling. PRI = 1 !--- Priority level
defined for the IP link. SIGSLOT = 0 SIGPORT = 0 NEXTHOP = 0.0.0.0 NETMASK = 255.255.255.255 */
; sc1 mml>
```

请使用此信息确信，在sigChanDevIp.dat配置的IP地址是正确的。

```
sc1 mml>rtrv-ne
   MGC-01 - Media Gateway Controller 2002-01-14 11:47:24
M  RTRV
   "Type:MGC"
   "Hardware platform:sun4u sparc SUNW,Ultra-60"
   "Vendor:"Cisco Systems, Inc.""
   "Location:MGC-01 - Media Gateway Controller"
   "Version:"7.4(11)"
!--- MGC software version running on PGW 2200. "Platform State:ACTIVE" !--- State of the PGW
2200. ; sc1 mml>rtrv-softw:all
!--- Make sure all the processes are active and running. MGC-01 - Media Gateway Controller 2002-
01-14 11:47:29 M RTRV "CFM-01:RUNNING ACTIVE" "ALM-01:RUNNING ACTIVE" "MM-01:RUNNING ACTIVE"
"AMDMPR-01:RUNNING ACTIVE" "CDRDMPR-01:RUNNING ACTIVE" "DSKM-01:RUNNING IN N/A STATE" "MMDB-
01:RUNNING IN N/A STATE" "POM-01:RUNNING ACTIVE" "MEASAGT:RUNNING ACTIVE" "OPERSAGT:RUNNING
ACTIVE" "PROVSAGT:RUNNING ACTIVE" "priip-1:RUNNING IN N/A STATE" "Replic-01:RUNNING ACTIVE"
```

```
"ENG-01:RUNNING ACTIVE" "IOCM-01:RUNNING ACTIVE" "TCAP-01:RUNNING IN N/A STATE" "ss7-a-1:RUNNING
IN N/A STATE" "FOD-01:RUNNING IN N/A STATE" "LOG-01:RUNNING IN N/A STATE" ; sc1 mml>rtrv-sc:all
   MGC-01 - Media Gateway Controller 2002-01-14 11:47:36
M  RTRV
   "gw1link1:signas1,LID=0:IS"
    !--- IP signaling link from the NAS to PGW 2200 (rlm group) !--- LID=0:IS means the RLM is
up. /* Link1 between gw1 and the sc2200-1 */ "ls1-link1:ls1,LID=0:IS"
!--- IP signaling link from the SLT to the PGW 2200 (C7IPLINK). /* Link1 for ls1 */ ; sc1
mml>rtrv-dest:all
   MGC-01 - Media Gateway Controller 2002-01-14 11:47:39
M  RTRV
   "dpc-sc2200:PKG=SS7-ANSI,ASSOC=signas1,PST=IS,SST=RSTO"
    !--- SS7 signal to the destination point code (DPC). "signas1:PKG=ISDNPRI,ASSOC=dpc-
sc2200,PST=IS,SST=RSTO"
!--- ISDN signaling between the NAS and the PGW 2200 !--- (same as show isdn status on NAS).

   ;

sc1 mml>rtrv-tc:all
   Retrieving results.  This could take a few moments...
   MGC-01 - Media Gateway Controller 2002-01-14 11:47:46
M  RTRV
   "dpc-sc2200:CIC=1,PST=IS,CALL=IDLE,BLK=NONE"
!--- InterMachine Trunk (IMT) status on SS7 side toward the DPC switch. "dpc-
sc2200:CIC=2,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=3,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=4,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=5,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=6,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=7,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=8,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=9,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=10,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=11,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=12,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=13,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=14,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=15,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=16,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=17,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=18,PST=IS,CALL=IDLE,BLK=NONE" <Press Enter to continue OR Press * and Enter to quit
output of command> "dpc-sc2200:CIC=19,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=20,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=21,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=22,PST=IS,CALL=IDLE,BLK=NONE" "dpc-sc2200:CIC=23,PST=IS,CALL=IDLE,BLK=NONE" "dpc-
sc2200:CIC=24,PST=IS,CALL=IDLE,BLK=NONE" "signas1:TC=1,CALL=IDLE,PST=IS,SPAN=0" !---
Corresponding T1 timeslots on the NAS gateway side to the SC !--- (same as show isdn service on
NAS) CALL= specify the direction of the call !--- SPAN=0 specify the nfas_int.

"signas1:TC=2,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=3,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=4,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=5,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=6,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=7,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=8,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=9,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=10,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=11,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=12,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=13,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=14,CALL=IDLE,PST=IS,SPAN=0"

<Press Enter to continue OR Press * and Enter to quit output of command>
   "signas1:TC=15,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=16,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=17,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=18,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=19,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=20,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=21,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=22,CALL=IDLE,PST=IS,SPAN=0"
   "signas1:TC=23,CALL=IDLE,PST=IS,SPAN=0"
```

```
   "signas1:TC=24,CALL=IDLE,PST=IS,SPAN=0"

sc1 mml>prov-rtrv:all
!--- Retrieved the current configuration on the PGW 2200. MGC-01 - Media Gateway Controller
2002-01-15 09:25:12 M RTRV "session=active:all" /* NAME COMPID Parent Name TID Description ----
-------- ----------- --- ----------- "sc1-card1" 00050001 "mgc-01" CARD "1st Ethernet card in
sc2200-1" "en1" 00060001 "sc1-card1" ENETIF "Interface for 1st ethernet card in sc2200-1" "ls1"
00080001 "dpc-sc2200" LNKSET "Link set from sc2200-2 to sc2200-1" "gw1link1"    00100001
"signas1"      IPLNK       "Link1 between gw1 and the sc2200-1"
"route1"      00110001  "mgc-01"       SS7ROUTE    "route for ls1"
"opc-sc2200"  00130001  "mgc-01"       PTCODE      "Own point code for SC2200-1"
"dpc-sc2200"  00130002  "mgc-01"       PTCODE      "dest point code sc2200-2"
"SIGNAS1"     00140001  "GW1"          NASPATH     "SIGNALING SERVICE TO GW1"
"ss7srv"      00150001  "dpc-sc2200"   SS7PATH     "SS7 service to switch-va"
"gw1"         00160001  "mgc-01"       EXTNODE     "Gateway 1 connected to switch-va"
"ls1-link1"   001d0001  "ls1"          C7IPLNK     "Link1 for ls1"
   */
   ;
sc1 mml>prov-rtrv:NASPATH:name="signas1"
   MGC-01 - Media Gateway Controller 2002-01-15 09:25:27
M  RTRV
"SESSION=ACTIVE:NASPATH"
   /*
NAME = signas1
DESC = Signaling service to gw1
EXTNODE = gw1
MDO = BELL_1268_C3
   */
   ;
 !--- In PGW release 9.3(2) and later, the BELL_1268_C3 variant !--- is changed to BELL_1268_C2.
prov-add:NASPATH:NAME="signas1",DESC="Signaling Service to V5300-1",EXTNODE="v5300-
1",MDO="BELL_1268_C2",CUSTGRPID="0000" sc1 mml>prov-rtrv:IPLNK:name="gw1link1"
 !--- Get detail information on the IP link to the PGW 2200. MGC-01 - Media Gateway Controller
2002-01-15 09:25:49 M RTRV "SESSION=ACTIVE:IPLNK" /* NAME = gw1link1 DESC = Link1 between gw1
and the sc2200-1 SVC = signas1 IF = en1 !--- Use Ethernet interface by sc1-card1 !--- which is
bound to the hme0 interface.

IPADDR = IP_Addr1
!--- IP_Addr1(172.16.13.132) defined in the XECfgParm.dat. PORT = 3001 !--- UDP port used for
the ISDN signaling. PEERADDR = 172.16.13.141 !--- IP address of the NAS gateway. PEERPORT = 3001
!--- UDP port to be used on the NAS gateway for ISDN signaling. PRI = 1 !--- Priority level
defined for the IP link. SIGSLOT = 0 SIGPORT = 0 NEXTHOP = 0.0.0.0 NETMASK = 255.255.255.255 */
; sc1 mml>
```

切记在ISDN/IP连接配置正确的ISDN协议运行。

获得在sigChanDevIp.dat文件内的PGW2200组件ID (00100001)信息IP链路的。然后，请去sigChanDev.dat文件并且获得信号路径组件ID的(00140001)组件ID在第四列。使用此信号路径组件ID，请使用sigPath.dat文件查找ISDN协议使用(ISDNPRI BELL_1268_C3)。

Note: 在PGW请发布9.3(2)及以后， BELL_1268_C3变量更改到BELL_1268_C2。

这是PGW2200的输出。

```
sc1% more sigChanDevIp.dat
00100001  IP_Addr1  3001  172.16.13.141  3001  0.0.0.0  255.255.255.255
001d0001  IP_Addr1  7000  172.16.13.139  32767  0.0.0.0  255.255.255.255
sc1% grep 00100001 *
components.dat:00100001  00140001  "gw1link1"
             "Link1 between gw1 and the sc2200-1"
sigChanDev.dat:00100001  00160001  1  00140001 0003000c  00060001  0
```

```
sigChanDevIp.dat:00100001 IP_Addr1  3001  172.16.13.141  3001  0.0.0.0 255.255.255.255
sc1%
sc1% grep 00140001 *
bearChan.dat:101 00130002 ffff 1 00140001 0 1
bearChan.dat:102 00130002 ffff 2 00140001 0 2
bearChan.dat:103 00130002 ffff 3 00140001 0 3
bearChan.dat:104 00130002 ffff 4 00140001 0 4
bearChan.dat:105 00130002 ffff 5 00140001 0 5
bearChan.dat:106 00130002 ffff 6 00140001 0 6
bearChan.dat:107 00130002 ffff 7 00140001 0 7
bearChan.dat:108 00130002 ffff 8 00140001 0 8
bearChan.dat:109 00130002 ffff 9 00140001 0 9
bearChan.dat:110 00130002 ffff a 00140001 0 a
bearChan.dat:111 00130002 ffff b 00140001 0 b
bearChan.dat:112 00130002 ffff c 00140001 0 c
bearChan.dat:113 00130002 ffff d 00140001 0 d
bearChan.dat:114 00130002 ffff e 00140001 0 e
bearChan.dat:115 00130002 ffff f 00140001 0 f
bearChan.dat:116 00130002 ffff 10 00140001 0 10
bearChan.dat:117 00130002 ffff 11 00140001 0 11
bearChan.dat:118 00130002 ffff 12 00140001 0 12
bearChan.dat:119 00130002 ffff 13 00140001 0 13
bearChan.dat:120 00130002 ffff 14 00140001 0 14
bearChan.dat:121 00130002 ffff 15 00140001 0 15
bearChan.dat:122 00130002 ffff 16 00140001 0 16
bearChan.dat:123 00130002 ffff 17 00140001 0 17
bearChan.dat:124 00130002 ffff 18 00140001 0 18
components.dat:00100001  00140001  "gw1link1"  "Link1 between gw1 and the sc2200-1"
components.dat:00140001  00160001  "signas1"  "Signaling service to gw1"
sigChanDev.dat:00100001  00160001  1  00140001  0003000c  00060001  0
sigPath.dat:00140001  ISDNPRI  BELL_1268_C3  0000  0101  22
network  n  0  0  0  2  0000  N

sc1%
```

注意：

- 00140001 —信号路径组件ID。
- ISDNPRI —为了ISDN的值在工作的IP。
- BELL_1268_C3 0 —指定主要的NI2协议类型(必须是ISDN的此值在IP)。

Note: 在PGW请发布9.3(2)及以后，BELL_1268_C3变量更改到BELL_1268_C2。

参考配置数据文件参考关于组件和.dat文件的更多信息。

这是暂挂PGW2200的一些参考信息。大多数此信息在服务范围外的(OOS)备用方式下。

```
sc3 mml>rtrv-ne
   MGC-02 - Media Gateway Controller 2002-01-15 17:42:50
M  RTRV
   "Type:MGC"
   "Hardware platform:sun4u sparc SUNW,Ultra-60"
   "Vendor:"Cisco Systems, Inc.""
   "Location:MGC-02 - Media Gateway Controller"
   "Version:"7.4(11)""
   "Platform State:STANDBY"
   !--- The current state of the PGW 2200. ; sc3 mml>rtrv-softw:all
!--- Note the processes are running in STANDBY mode. MGC-02 - Media Gateway Controller 2002-01-
15 17:42:54 M RTRV "CFM-01:RUNNING STANDBY" "ALM-01:RUNNING STANDBY" "MM-01:RUNNING STANDBY"
"AMDMPR-01:RUNNING STANDBY" "CDRDMPR-01:RUNNING STANDBY" "DSKM-01:RUNNING IN N/A STATE" "MMDB-
01:RUNNING IN N/A STATE" "POM-01:RUNNING STANDBY" "MEASAGT:RUNNING STANDBY" "OPERSAGT:RUNNING
```

```
STANDBY" "PROVSAGT:RUNNING STANDBY" "priip-1:RUNNING IN N/A STATE" "Replic-01:RUNNING STANDBY"
"ENG-01:RUNNING STANDBY" "IOCM-01:RUNNING STANDBY" "TCAP-01:RUNNING IN N/A STATE" "ss7-a-
1:RUNNING IN N/A STATE" "FOD-01:RUNNING IN N/A STATE" <Press Enter to continue OR Press * and
Enter to quit output of command> "LOG-01:RUNNING IN N/A STATE" ; sc3 mml> rtrv-sc:all
   MGC-02 - Media Gateway Controller 2002-01-15 17:43:00
M  RTRV
   "GW1LINK1:SIGNAS1,LID=0:OOS,STBY"
   /* Link1 between gw1 and the sc2200-1 */
   "ls1-link1:ls1,LID=0:OOS,STBY"
   /* Link1 for ls1 */
   ;
sc3 mml> rtrv-dest:all
   MGC-02 - Media Gateway Controller 2002-01-15 17:43:04
M  RTRV
   "dpc-sc2200:PKG=SS7-ANSI,ASSOC=signas1,PST=IS,SST=RSTO"
   "SIGNAS1:PKG=ISDNPRI,ASSOC=DPC-SC2200,PST=IS,SST=RSTO"
   ;
```

Troubleshoot

本部分提供的信息可用于对配置进行故障排除。

故障排除命令

命令输出解释程序工具（仅限注册用户）支持某些 **show** 命令，使用此工具可以查看对 show 命令输出的分析。

Note: 发出 **debug** 命令之前，请参阅有关 Debug 命令的重要信息。

- **debug rlm group x** —显示关于Keepalive的信息和在PGW2200和NAS网关之间的信息包流。
- **show access-list 199** —在PGW2200和NAS之间的数据流用于过滤。
- **debug ip packet 199 detail** —显示详细IP调试信息。
- **debug isdn q921** —显示发生在ISDN接口的D信道的路由器的数据链路层2接入过程。
- **show debug** —显示调试信息。
- **show isdn status** —显示所有ISDN接口的状况。
- **show rlm group 0** —显示RLM的状态。

当您排除NAS和PGW2200之间时的通信故障，有两主要部分：

- RLM信令
- ISDN信令

能造成RLM在故障状态的几个问题是：

- 在路由器或PGW2200的配置错误。
- 实际上，接口(以太网，快速以太网，序列x:23)被关闭或有电缆。
- 阻拦两个设备IP地址之间的通信， UDP端口3000的访问列表(RLM-mgr)，和3001 (ISDN)。

在NAS网关上，请运行**debug rlm group x命令**查看Keepalive和信息包流在PGW2200和NAS网关之间。

此输出显示NAS网关的若干example命令输出。在正常运行，有恒定的Keepalive (ECHO_REQ和ECHO_ACK)交换了在NAS网关和PGW2200之间每1秒。如果这不发生，请推测谁是不回应或发送Keepalive。

Note: TID (交易ID)是同一ECHO请求和响应确认。即使另一PGW2200 (172.16.13.134)在备用方式

下，与NAS网关经常联络。

```
NAS1#debug rlm group 0
RLM Group debugging is on
NAS1#terminal monitor
NAS1#
*Jan 14 14:50:53.270: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] tx ECHO_REQ(tid=15304)
*Jan 14 14:50:53.270: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=15734)
*Jan 14 14:50:53.270: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] rx ECHO_ACK(tid=15304)
*Jan 14 14:50:53.270: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=15734)

*Jan 14 14:50:54.270: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] tx ECHO_REQ(tid=15305)
*Jan 14 14:50:54.270: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=15735)
*Jan 14 14:50:54.270: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] rx ECHO_ACK(tid=15305)
*Jan 14 14:50:54.270: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=15735)
```

当您发出no shut命令对RLM组时，这是RLM组的启动和ISDN信令。

```
NAS1#show access-list 199
!--- Access-list used to filter on traffic between !--- the PGW 2200 and the NAS. Extended IP
access list 199 permit ip host 172.16.13.132 host 172.16.13.141 permit ip host 172.16.13.141
host 172.16.13.132 NAS1#debug ip packet 199 det
IP packet debugging is on (detailed) for access list 199
NAS1#debug rlm group 0
RLM Group debugging is on
NAS1#debug isdn q921
ISDN Q921 packets debugging is on
NAS1#debug rlm group 0 event
RLM Group Event debugging is on
NAS1#debug rlm group 0 packet
RLM Group Packet debugging is on
NAS1#show debug
Generic IP:
  IP packet debugging is on (detailed) for access list 199
RLM_GROUP:
  RLM Group debugging is on
  RLM Group Event debugging is on
  RLM Group Packet debugging is on
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -
NAS1#
NAS1#configure term
Enter configuration commands, one per line.  End with CNTL/Z.
NAS1(config)#rlm group
NAS1(config)#rlm group 0
NAS1(config-rlm-group)#no shut
NAS1(config-rlm-group)#end
NAS1#

!--- Receive event to enable RLM and wait for the force-down timer !--- to expire before it
```

starts to send the keepalives to !--- establish the link to the PGW 2200. ***Jan 14 18:04:21.734: rlm 0: [State_Shutdown, rx ENABLE]***
*Jan 14 18:04:22.222: %SYS-5-CONFIG_I: Configured from console by vty0 (171.69.85.65)

NAS1#**show rlm group 0**
RLM Group 0 Status
 User/Port: RLM_MGR/3000 ISDN/3001
 RLM Version : 2
 Link State: Down Last Link Status Reported: Down
!--- Current state of the RLM group. Next tx TID: 1 Last rx TID: 0 Server Link Group[sc1]: Last Reported Priority: HIGH link [172.16.13.141(FastEthernet0), **172.16.13.132] = socket[closed]**
!--- Communication socket is closed. Server Link Group[sc3]: Last Reported Priority: LOW link [172.16.13.141(FastEthernet0), 172.16.13.134] = socket[closed] RLM Group 0 Timer Values open_wait = 3s force-down = 30s recovery = 12s switch-link = 5s minimum-up = 60s retransmit = 1s keepalive = 1s RLM Group 0 Statistics Link_up: last time occurred at *Jan 14 17:59:49.870, total transition=4 avg=01:49:34.264, max=05:40:16.976, min=00:00:00.000, latest=00:02:08.728 Link_down: last time occurred at *Jan 14 18:01:58.598, total transition=3 avg=00:08:27.002, max=00:16:18.004, min=00:00:00.000, latest=00:16:18.004 Link_recovered: last time occurred at *Jan 14 12:03:14.887, success=2(100%), failure=0 avg=0.004s, max=0.004s, min=0.000s, latest=0.004s Link_switched: last time occurred at none, success=0(0%), failure=0 avg=0.000s, max=0.000s, min=0.000s, latest=0.000s Server_changed: last time occurred at *Jan 14 12:03:14.891 for totally 2 times Server Link Group[sc1]: Open the link [172.16.13.141(FastEthernet0), 172.16.13.132]: last time occurred at *Jan 14 17:59:46.870, success=2(100%), failure=0 avg=1.502s, max=3.000s, min=0.000s, latest=0.004s Echo over link [172.16.13.141(FastEthernet0), 172.16.13.132]: last time occurred at *Jan 14 18:01:57.874, success=25581(99%), failure=35 avg=0.000s, max=0.032s, min=0.000s, latest=0.000s Server Link Group[sc3]: Open the link [172.16.13.141(FastEthernet0), 172.16.13.134]: last time occurred at *Jan 14 17:59:46.870, success=2(100%), failure=0 avg=1.502s, max=3.000s, min=0.000s, latest=0.004s Echo over link [172.16.13.141(FastEthernet0), 172.16.13.134]: last time occurred at *Jan 14 18:01:57.874, success=26182(99%), failure=40 avg=0.000s, max=0.032s, min=0.000s, latest=0.000s NAS1#**show isdn status**
!--- ISDN status is always DOWN if RLM is not up and running. Global ISDN Switchtype = primary-ni ISDN Serial0:23 interface rlm-group = 0 dsl 0, interface ISDN Switchtype = primary-ni :
Primary D-channel of nfas group 0 Layer 1 Status: **DEACTIVATED**
Layer 2 Status:
        TEI = 0, Ces = 1, SAPI = 0, State = **TEI_ASSIGNED**
    Layer 3 Status:
        0 Active Layer 3 Call(s)
    Active dsl 0 CCBs = 0
    The Free Channel Mask: 0xFFFFFF
    Total Allocated ISDN CCBs = 0
NAS1#

!--- Force-down timer expired and router starts to send out !--- the ECHO_REQ to the PGW 2200 to establish the link. *Jan 14 18:04:51.734: rlm 0: [State_Down, **rx DOWN_MIN_TIMEOUT]**
*Jan 14 18:04:51.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] = socket[172.16.13.141, 172.16.13.132]

!--- Open the RLM user socket for both the RLM !--- manager and ISDN signaling. !--- Router sends out ECHO_REQ (RLM keepalive) to !--- the PGW 2200 to start the communication. *Jan 14 18:04:51.734: rlm 0: [State_Down, rx USER_SOCKET_OPENED] over link [172.16.13.141(FastEthernet0), 172.16.13.132] for user RLM_MGR *Jan 14 18:04:51.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] **is opened**
*Jan 14 18:04:51.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] **tx ECHO_REQ(tid=25616)**
*Jan 14 18:04:51.734: **IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending**
*Jan 14 18:04:51.734:   **UDP src=3000, dst=3000**
*Jan 14 18:04:51.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] = socket[172.16.13.141, 172.16.13.132]
*Jan 14 18:04:51.734: rlm 0: [State_Down, rx USER_SOCKET_OPENED] over link [172.16.13.141(FastEthernet0), 172.16.13.132] **for user ISDN**

!--- Same process for the standby PGW 2200. *Jan 14 18:04:51.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] = socket[172.16.13.141, 172.16.13.134] *Jan 14 18:04:51.734: rlm 0: [State_Down, rx USER_SOCKET_OPENED] over link [172.16.13.141(FastEthernet0), 172.16.13.134] for user RLM_MGR *Jan 14 18:04:51.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] is opened *Jan 14 18:04:51.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] **tx ECHO_REQ(tid=26222)**
*Jan 14 18:04:51.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] = socket[172.16.13.141, 172.16.13.134]
*Jan 14 18:04:51.738: rlm 0: [State_Down, rx USER_SOCKET_OPENED] over link [172.16.13.141(FastEthernet0), 172.16.13.134] for user ISDN
*Jan 14 18:04:51.738: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 36, rcvd 3
*Jan 14 18:04:51.738:   UDP src=3000, dst=3000

!--- Recevied the ECHO_ACK back from the active and !--- standby PGW 2200. *Jan 14 18:04:51.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] rx **ECHO_ACK(tid=25616)**
*Jan 14 18:04:51.738: rlm 0: [State_Down, rx LINK_OPENED] over link [172.16.13.141(FastEthernet0), 172.16.13.132]
*Jan 14 18:04:51.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx **ECHO_ACK(tid=26222)**
*Jan 14 18:04:51.738: rlm 0: [State_Down, rx LINK_OPENED] over link [172.16.13.141(FastEthernet0), 172.16.13.134]

!--- Router continues to send out ECHO_REQ and !--- receive ECHO_ACK several times. !--- This is needed to make sure the communication !--- between the NAS gateway and PGW 2200 is good. *Jan 14 18:04:52.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=25617) *Jan 14 18:04:52.738: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 14 18:04:52.738: UDP src=3000, dst=3000 *Jan 14 18:04:52.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=26223) *Jan 14 18:04:52.738: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 36, rcvd 3 *Jan 14 18:04:52.738: UDP src=3000, dst=3000 *Jan 14 18:04:52.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] rx ECHO_ACK(tid=25617) *Jan 14 18:04:52.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=26223) *Jan 14 18:04:53.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=25618) *Jan 14 18:04:53.738: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 14 18:04:53.738: UDP src=3000, dst=3000 *Jan 14 18:04:53.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=26224) *Jan 14 18:04:53.738: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 36, rcvd 3 *Jan 14 18:04:53.738: UDP src=3000, dst=3000 *Jan 14 18:04:53.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] rx ECHO_ACK(tid=25618) *Jan 14 18:04:53.738: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=26224) *!--- After three keepalives are transmitted and three replies !--- are received back (approximately the open_wait timer), the router !--- starts the link activation. !--- Note that all of the links have a preferred weight !--- association. NAS chooses the link with the highest preference !--- among those successful links. NAS waits for !--- a certain amount of time specified by open_wait timer !--- (three seconds) to allow the highest preference connections to reach !--- the PGW 2200 before it selects the signaling link. !--- Once the highest preference link is established, !--- NAS chooses it as the active signaling link immediately and does not wait !--- for the rest of the connections. Once the active signaling link is decided, !--- NAS sends out the datagram RLM message START_REQ over the chosen !--- link to the PGW 2200. When PGW 2200 receives this message, !--- SAS responds with a START_ACK message and then declares the !--- link to be up as well. At this point, the PGW 2200 can start !--- to transmit packets. When NAS receives START_ACK back, NAS !--- declares the link to be up or active and leaves the rest of the links alone. !--- For managing UDP links, UDP sockets opened under an active !--- link are assigned to those registered RLM users for !--- transmitting and receiving packets. The status RLM_LINK_UP !--- is reported to RLM users after the signaling link is !--- established and synchronized. At this point, NAS can start !--- to transmit packets. Due to the unreliable transport under UDP, !--- these START_REQ and START_ACK packets can get lost. RLM uses !--- the timer retransmission timer to wait for the START_ACK. !--- If the timer expires and the link is still not closed or down, the packet !--- is resent under UDP.* *Jan 14 18:04:54.734: rlm 0: [State_Down, rx OPEN_WAIT_TIMEOUT] *Jan 14 18:04:54.734: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] **tx START_REQ(tid=0)**
*Jan 14 18:04:54.734: **IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending**

*Jan 14 18:04:54.734: **UDP src=3000, dst=3000**
*Jan 14 18:04:54.734: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] **requests activation**

*Jan 14 18:04:54.734: **IP: s=172.16.13.132 (FastEthernet0),
d=172.16.13.141 (FastEthernet0), len 36, rcvd 3**
*Jan 14 18:04:54.734: **UDP src=3000, dst=3000**
!--- RLM manager UDP port. *Jan 14 18:04:54.734: **IP: s=172.16.13.132 (FastEthernet0),
d=172.16.13.141
(FastEthernet0), len 31, rcvd 3**
*Jan 14 18:04:54.734: **UDP src=3001, dst=3001**
!--- ISDN signaling UDP port. *Jan 14 18:04:54.734: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] **rx START_ACK(tid=0)**
*Jan 14 18:04:54.734: rlm 0: [State_Down, rx START_ACK] over link
[172.16.13.141(FastEthernet0), 172.16.13.132]
*Jan 14 18:04:54.734: **%ISDN-4-RLM_STATUS_CHANGE: ISDN SC Se0:23
SC: Status Changed to: Link Up.**
*Jan 14 18:04:54.734: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] **is activated**

!--- The router starts to establish the ISDN signaling !--- with the PGW 2200. Note, the NAS gateway sends the !--- signaling packet across the FastEthernet interface using UDP !--- port 3001. Once both sides have received the !--- Unnumbered Acknowledge (UA) frame from each other, ISDN Layer 2 status !--- moves from the TEI_ASSIGNED state to the MULTIPLE_FRAME_ESTABLISHED state. !--- Next, normal ISDN keepalives (RRf and RRp) are being exchanged between !--- the PGW 2200 and the NAS gateway. *Jan 14 18:04:54.738: ISDN Se0:23 SC: **RX <- SABMEp** c/r = 1 sapi = 0
tei = 0
*Jan 14 18:04:54.738: %ISDN-6-LAYER2UP: Layer 2 for
Interface Se0:23 SC, TEI 0 changed to up
*Jan 14 18:04:54.738: ISDN Se0:23 SC:
TX -> SABMEp c/r = 0 sapi = 0 tei = 0
*Jan 14 18:04:54.738: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 31, sending
*Jan 14 18:04:54.738: UDP src=3001, dst=3001
*Jan 14 18:04:54.742:
ISDN Se0:23 SC: TX -> UAf c/r = 1 sapi = 0 tei = 0
*Jan 14 18:04:54.742: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 31, sending
*Jan 14 18:04:54.742: UDP src=3001, dst=3001
*Jan 14 18:04:54.742: ISDN Se0:23 SC: TX -> INFOc sapi = 0 tei = 0
ns = 0 nr = 0 i = 0x430200000A6808C000000000000000
*Jan 14 18:04:54.742: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 47, sending
*Jan 14 18:04:54.742: UDP src=3001, dst=3001
*Jan 14 18:04:54.742: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=26225)
*Jan 14 18:04:54.742: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141
(FastEthernet0), len 31, rcvd 3
*Jan 14 18:04:54.742: UDP src=3001, dst=3001
*Jan 14 18:04:54.742: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141
(FastEthernet0), len 32, rcvd 3
*Jan 14 18:04:54.746: UDP src=3001, dst=3001
*Jan 14 18:04:54.746: ISDN Se0:23 SC: TX -> INFOc sapi = 0 tei = 0
ns = 1 nr = 0 i = 0x430200000A6808C000000000000000
*Jan 14 18:04:54.746: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 47, sending
*Jan 14 18:04:54.746: UDP src=3001, dst=3001
*Jan 14 18:04:54.746: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134]
rx ECHO_ACK(tid=26225)
*Jan 14 18:04:54.746: **ISDN Se0:23 SC: RX <- UAf** c/r = 0 sapi = 0 tei = 0
*Jan 14 18:04:54.746: ISDN Se0:23 SC: RX <- RRr sapi = 0 tei = 0 nr = 1
*Jan 14 18:04:54.750: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141
(FastEthernet0), len 32, rcvd 3
*Jan 14 18:04:54.750: UDP src=3001, dst=3001

```
*Jan 14 18:04:54.750: ISDN Se0:23 SC: RX <-  RRr sapi = 0  tei = 0  nr = 2
*Jan 14 18:04:54.754: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141
(FastEthernet0), len 41, rcvd 3
*Jan 14 18:04:54.754:     UDP src=3001, dst=3001
*Jan 14 18:04:54.758: ISDN Se0:23 SC: RX <-  INFOc sapi = 0  tei = 0  ns = 0
 nr = 2  i = 0x430280005A080283A9
*Jan 14 18:04:54.758: ISDN Se0:23 SC: TX ->  RRr sapi = 0  tei = 0  nr = 1
*Jan 14 18:04:54.758: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 32, sending
*Jan 14 18:04:54.758:     UDP src=3001, dst=3001
*Jan 14 18:04:54.766: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141
(FastEthernet0), len 41, rcvd 3
*Jan 14 18:04:54.766:     UDP src=3001, dst=3001
*Jan 14 18:04:54.766: ISDN Se0:23 SC: RX <-  INFOc sapi = 0  tei = 0
 ns = 1  nr = 2  i = 0x430280005A080283A9
*Jan 14 18:04:54.766: ISDN Se0:23 SC: TX ->  RRr sapi = 0  tei = 0  nr = 2
*Jan 14 18:04:54.766: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 32, sending
*Jan 14 18:04:54.770:     UDP src=3001, dst=3001
*Jan 14 18:04:55.742: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=26226)
*Jan 14 18:04:55.742: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=26226)
*Jan 14 18:04:56.734: %LINK-3-UPDOWN: Interface Serial0:23,
changed state to up
*Jan 14 18:04:56.742: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] tx ECHO_REQ(tid=25619)
*Jan 14 18:04:56.742: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 36, sending
*Jan 14 18:04:56.742:     UDP src=3000, dst=3000
*Jan 14 18:04:56.742: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=26227)
*Jan 14 18:04:56.742: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141
(FastEthernet0), len 36, rcvd 3
*Jan 14 18:04:56.742:     UDP src=3000, dst=3000
*Jan 14 18:04:56.742: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] rx ECHO_ACK(tid=25619)
*Jan 14 18:04:56.742: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=26227)
*Jan 14 18:04:57.742: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] tx ECHO_REQ(tid=25620)
*Jan 14 18:04:57.742: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 36, sending
*Jan 14 18:04:57.742:     UDP src=3000, dst=3000
*Jan 14 18:04:57.742: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=26228)
*Jan 14 18:04:57.742: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141
(FastEthernet0), len 36, rcvd 3
*Jan 14 18:04:57.742:     UDP src=3000, dst=3000
*Jan 14 18:04:57.742: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] rx ECHO_ACK(tid=25620)
*Jan 14 18:04:57.742: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=26228)
*Jan 14 18:04:57.866: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141
 (FastEthernet0), len 47, rcvd 3
*Jan 14 18:04:57.866:     UDP src=3001, dst=3001
*Jan 14 18:04:57.866: ISDN Se0:23 SC: RX <-  INFOc sapi = 0  tei = 0
ns = 2  nr = 2  i = 0x430200000A6808C000000000000000
*Jan 14 18:04:57.866: ISDN Se0:23 SC: TX ->  RRr sapi = 0  tei = 0  nr = 3
*Jan 14 18:04:57.870: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 32, sending
*Jan 14 18:04:57.870:     UDP src=3001, dst=3001
*Jan 14 18:04:57.870: ISDN Se0:23 SC: TX ->  INFOc sapi = 0  tei = 0
ns = 2  nr = 3  i = 0x430280000A6808C000000000000000
```

```
*Jan 14 18:04:57.870: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 47, sending
*Jan 14 18:04:57.870:     UDP src=3001, dst=3001
*Jan 14 18:04:57.870: ISDN Se0:23 SC: TX ->  INFOc sapi = 0  tei = 0
ns = 3  nr = 3  i = 0x43020000006660500FFFFFF00
*Jan 14 18:04:57.874: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 44, sending
*Jan 14 18:04:57.874:     UDP src=3001, dst=3001
*Jan 14 18:04:57.874: IP: s=172.16.13.132 (FastEthernet0),
d=172.16.13.141 (FastEthernet0), len 32, rcvd 3
*Jan 14 18:04:57.874:     UDP src=3001, dst=3001
*Jan 14 18:04:57.874: ISDN Se0:23 SC: RX <-  RRr sapi = 0  tei = 0  nr = 3
*Jan 14 18:04:57.874: IP: s=172.16.13.132 (FastEthernet0),
d=172.16.13.141 (FastEthernet0), len 32, rcvd 3
*Jan 14 18:04:57.874:     UDP src=3001, dst=3001
*Jan 14 18:04:57.874: ISDN Se0:23 SC: RX <-  RRr sapi = 0  tei = 0  nr = 4
*Jan 14 18:04:57.886: IP: s=172.16.13.132 (FastEthernet0),
d=172.16.13.141 (FastEthernet0), len 44, rcvd 3
*Jan 14 18:04:57.886:     UDP src=3001, dst=3001
*Jan 14 18:04:57.886: ISDN Se0:23 SC: RX <-  INFOc sapi = 0
tei = 0  ns = 3  nr = 4  i = 0x430280000B660500FFFFFF00
*Jan 14 18:04:57.886: ISDN Se0:23 SC: TX ->  RRr sapi = 0  tei = 0  nr = 4
*Jan 14 18:04:57.886: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 32, sending
*Jan 14 18:04:57.890:     UDP src=3001, dst=3001
*Jan 14 18:04:58.386: IP: s=172.16.13.132 (FastEthernet0),
d=172.16.13.141 (FastEthernet0), len 44, rcvd 3
*Jan 14 18:04:58.386:     UDP src=3001, dst=3001
*Jan 14 18:04:58.386: ISDN Se0:23 SC: RX <-  INFOc sapi = 0
 tei = 0  ns = 4  nr = 4  i = 0x43020000086705000000000
*Jan 14 18:04:58.386: ISDN Se0:23 SC: TX ->  RRr sapi = 0  tei = 0  nr = 5
*Jan 14 18:04:58.390: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 32, sending
*Jan 14 18:04:58.390:     UDP src=3001, dst=3001
*Jan 14 18:04:58.390: ISDN Se0:23 SC: TX ->  INFOc sapi = 0
tei = 0  ns = 4  nr = 5  i = 0x43028000096705000000000
*Jan 14 18:04:58.390: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 44, sending
*Jan 14 18:04:58.390:     UDP src=3001, dst=3001
*Jan 14 18:04:58.394: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141
(FastEthernet0), len 32, rcvd 3
*Jan 14 18:04:58.394:     UDP src=3001, dst=3001
NAS1#undebug all
All possible debugging has been turned off
NAS1#
NAS1#show rlm group 0
RLM Group 0 Status
 User/Port: RLM_MGR/3000 ISDN/3001
 RLM Version : 2
 Link State: Up         Last Link Status Reported: Up
 Next tx TID: 1         Last rx TID: 0
 Server Link Group[sc1]: Last Reported Priority: HIGH
  link [172.16.13.141(FastEthernet0), 172.16.13.132] = socket[active]
 Server Link Group[sc3]: Last Reported Priority: LOW
  link [172.16.13.141(FastEthernet0), 172.16.13.134] = socket[standby]

RLM Group 0 Timer Values
 open_wait  = 3s               force-down  = 30s
 recovery   = 12s              switch-link = 5s
 minimum-up = 60s              retransmit  = 1s
 keepalive  = 1s

RLM Group 0 Statistics
 Link_up:
```

```
     last time occurred at *Jan 14 18:04:54.734, total transition=5
     avg=01:49:34.264, max=05:40:16.976, min=00:00:00.000, latest=00:02:08.728
 Link_down:
     last time occurred at *Jan 14 18:01:58.598, total transition=3
     avg=00:06:36.713, max=00:16:18.004, min=00:00:00.000, latest=00:02:56.136
 Link_recovered:
     last time occurred at *Jan 14 12:03:14.887, success=2(100%), failure=0
     avg=0.004s, max=0.004s, min=0.000s, latest=0.004s
 Link_switched:
     last time occurred at none, success=0(0%), failure=0
     avg=0.000s, max=0.000s, min=0.000s, latest=0.000s
 Server_changed:
     last time occurred at *Jan 14 12:03:14.891 for totally 2 times
 Server Link Group[sc1]:
  Open the link [172.16.13.141(FastEthernet0), 172.16.13.132]:
     last time occurred at *Jan 14 18:04:51.734, success=3(100%), failure=0
     avg=1.002s, max=3.000s, min=0.000s, latest=0.004s
  Echo over link [172.16.13.141(FastEthernet0), 172.16.13.132]:
     last time occurred at *Jan 14 18:05:02.742, success=25590(99%), failure=35
     avg=0.000s, max=0.032s, min=0.000s, latest=0.000s
 Server Link Group[sc3]:
  Open the link [172.16.13.141(FastEthernet0), 172.16.13.134]:
     last time occurred at *Jan 14 18:04:51.734, success=3(100%), failure=0
     avg=1.002s, max=3.000s, min=0.000s, latest=0.004s
  Echo over link [172.16.13.141(FastEthernet0), 172.16.13.134]:
     last time occurred at *Jan 14 18:05:02.742, success=26194(99%), failure=40
     avg=0.000s, max=0.032s, min=0.000s, latest=0.000s

all
All possible debugging has been turned off
NAS1#
NAS1#show isdn stat
Global ISDN Switchtype = primary-ni
ISDN Serial0:23 interface       rlm-group = 0
        dsl 0, interface
   ISDN Switchtype = primary-ni : Primary D channel of nfas group 0
    Layer 1 Status:
        ACTIVE
    Layer 2 Status:
TEI = 0, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED
    Layer 3 Status:
        0 Active Layer 3 Call(s)
    Active dsl 0 CCBs = 0
    The Free Channel Mask:  0x80FFFFFF
    Total Allocated ISDN CCBs = 0
NAS1#
```

这是一个切换的示例调试输出从活动PGW2200到一暂挂PGW2200。

```
NAS1#show rlm group 0
RLM Group 0 Status
 User/Port: RLM_MGR/3000 ISDN/3001
 RLM Version : 2
 Link State: Up   Last Link Status Reported: Up
 Next tx TID: 1         Last rx TID: 0
 Server Link Group[sc1]: Last Reported Priority: HIGH
  link [172.16.13.141(FastEthernet0), 172.16.13.132] = socket[active]
 Server Link Group[sc3]: Last Reported Priority: LOW
  link [172.16.13.141(FastEthernet0), 172.16.13.134] = socket[standby]

RLM Group 0 Timer Values
 open_wait  = 3s               force-down  = 30s
 recovery   = 12s              switch-link = 5s
```

```
 minimum-up = 60s               retransmit  = 1s
 keepalive  = 1s

RLM Group 0 Statistics
 Link_up:
     last time occurred at *Jan 15 17:26:51.635, total transition=1
     avg=00:00:00.000, max=00:00:00.000, min=00:00:00.000, latest=00:00:00.000
 Link_down:
     last time occurred at *Jan 15 17:26:15.635, total transition=1
     avg=00:00:36.000, max=00:00:36.000, min=00:00:00.000, latest=00:00:36.000
 Link_recovered:
     last time occurred at none, success=0(0%), failure=0
     avg=0.000s, max=0.000s, min=0.000s, latest=0.000s
 Link_switched:
     last time occurred at none, success=0(0%), failure=0
     avg=0.000s, max=0.000s, min=0.000s, latest=0.000s
 Server_changed:
     last time occurred at none for totally 0 times
 Server Link Group[sc1]:
  Open the link [172.16.13.141(FastEthernet0), 172.16.13.132]:
     last time occurred at *Jan 15 17:26:45.635, success=1(100%), failure=0
     avg=3.000s, max=3.000s, min=0.000s, latest=3.000s
  Echo over link [172.16.13.141(FastEthernet0), 172.16.13.132]:
     last time occurred at *Jan 15 18:35:57.371, success=4009(99%), failure=1
     avg=0.000s, max=0.068s, min=0.000s, latest=0.000s
 Server Link Group[sc3]:
  Open the link [172.16.13.141(FastEthernet0), 172.16.13.134]:
     last time occurred at *Jan 15 17:26:45.635, success=1(100%), failure=0
     avg=3.000s, max=3.000s, min=0.000s, latest=3.000s
  Echo over link [172.16.13.141(FastEthernet0), 172.16.13.134]:
     last time occurred at *Jan 15 18:35:57.371, success=4149(99%), failure=1
     avg=0.000s, max=0.068s, min=0.000s, latest=0.000s



NAS1#show debug
NAS1#
NAS1#show access-list 199
Extended IP access list 199
    permit ip host 172.16.13.132 host 172.16.13.141
    permit ip host 172.16.13.141 host 172.16.13.132
NAS1#debug rlm group 0 event
RLM Group Event debugging is on

NAS1#debug rlm group 0 packet
RLM Group Packet debugging is on
NAS1#debug rlm group 0
RLM Group debugging is on
NAS1#debug isdn q921
ISDN Q921 packets debugging is on
NAS1#debug ip packet 199 detail
IP packet debugging is on (detailed) for access list 199
NAS1#terminal monitor
NAS1#

!--- Note the keepalives are exchanged normally. *Jan 15 18:37:20.507: rlm 0: link
[172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=4090) *Jan 15 18:37:20.507: IP:
s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 15 18:37:20.507:
UDP src=3000, dst=3000 *Jan 15 18:37:20.507: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=4232) *Jan 15 18:37:20.507: IP: s=172.16.13.132 (FastEthernet0),
d=172.16.13.141 (FastEthernet0), len 36, rcvd 3 *Jan 15 18:37:20.507: UDP src=3000, dst=3000
*Jan 15 18:37:20.507: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] rx
ECHO_ACK(tid=4090) *Jan 15 18:37:20.507: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=4232) *Jan 15 18:37:21.507: rlm 0: link
```

[172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=4091) *Jan 15 18:37:21.507: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending *Jan 15 18:37:21.507: UDP src=3000, dst=3000 *Jan 15 18:37:21.507: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_REQ(tid=4233) *Jan 15 18:37:21.511: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_ACK(tid=4233) *!--- **Note:** The NAS gateway receives !--- an ECHO_REQ from the PGW 2200 !--- when the switch-over occurs. Within the packet, there is a change in the !--- priority setting and the NAS gateway is informed to re-establish the link to !--- the new active PGW 2200 (172.16.13.134).*

*Jan 15 18:37:21.763: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] rx ECHO_REQ(tid=1)
*Jan 15 18:37:21.763: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] tx ECHO_ACK(tid=1)

*Jan 15 18:37:21.763: rlm 0 server : **sc3 changing priority from LOW to HIGH**
*Jan 15 18:37:21.763: rlm 0: [State_Up, rx NEW_LINK_WEIGHTING] over link [172.16.13.141(FastEthernet0), 172.16.13.134]
*Jan 15 18:37:21.763: rlm 0 **Link ordering : New Server sc3**
*Jan 15 18:37:21.763: rlm 0 **Link ordering : Current Server sc1**

!--- The NAS gateway starts the link activation !--- toward the new active PGW 2200 and becomes active. The other !--- link is deactivated and goes into standby. *Jan 15 18:37:21.763: rlm 0: link [172.16.13.141(FastEthernet0), **172.16.13.134] tx START_REQ**(tid=1)
*Jan 15 18:37:21.763: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.134] **requests activation**
*Jan 15 18:37:21.767: rlm 0: link [172.16.13.141(FastEthernet0), **172.16.13.134] rx START_ACK**(tid=1)
*Jan 15 18:37:21.767: rlm 0: [State_Recover, rx START_ACK] over link [172.16.13.141(FastEthernet0), 172.16.13.134]
*Jan 15 18:37:21.767: rlm 0: link [172.16.13.141(FastEthernet0), **172.16.13.132] is deactivated**
Jan 15 18:37:21.767: %ISDN-4-RLM_STATUS_CHANGE: ISDN SC Se0:23 SC: Status Changed to: Server Switched.
*Jan 15 18:37:21.767: rlm 0: link [172.16.13.141(FastEthernet0), **172.16.13.134] is activated**
*Jan 15 18:37:21.767: ISDN Se0:23 SC: TX -> INFOc sapi = 0 tei = 0 ns = 4 nr = 4 i = 0x430200000A6808C000000000000000

!--- The NAS gateway needs to re-establish the ISDN !--- signaling with the new active PGW 2200. *Jan 15 18:37:21.771: **ISDN Se0:23 SC: RX <- SABMEp** c/r = 1 sapi = 0 tei = 0
*Jan 15 18:37:22.519: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=4092)
*Jan 15 18:37:22.519: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending
*Jan 15 18:37:22.519: UDP src=3000, dst=3000
*Jan 15 18:37:22.523: IP: s=172.16.13.132 (FastEthernet0), d=172.16.13.141 (FastEthernet0), len 64, rcvd 3
*Jan 15 18:37:22.523: ICMP type=3, code=3
*Jan 15 18:37:22.863:
ISDN Se0:23 SC: RX <- SABMEp c/r = 1 sapi = 0 tei = 0
*Jan 15 18:37:22.863:
ISDN Se0:23 SC: TX -> UAf c/r = 1 sapi = 0 tei = 0
*Jan 15 18:37:23.523: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=4093)
*Jan 15 18:37:23.523: IP: s=172.16.13.141 (local), d=172.16.13.132 (FastEthernet0), len 36, sending
*Jan 15 18:37:23.523: UDP src=3000, dst=3000

*Jan 15 18:37:24.527: rlm 0: [State_Up, rx LINK_BROKEN] over link [172.16.13.141(FastEthernet0), 172.16.13.132]
*Jan 15 18:37:24.527: rlm 0: link [172.16.13.141(FastEthernet0), 172.16.13.132] tx ECHO_REQ(tid=4094)
*Jan 15 18:37:24.527: IP: s=172.16.13.141 (local), d=172.16.13.132

```
(FastEthernet0), len 36, sending
*Jan 15 18:37:24.527:     UDP src=3000, dst=3000

*Jan 15 18:37:24.527: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=4234)
*Jan 15 18:37:24.527: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=4234)
*Jan 15 18:37:25.527: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=4235)
*Jan 15 18:37:25.527: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=4235)
*Jan 15 18:37:26.527: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=4236)
*Jan 15 18:37:26.527: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=4236)
*Jan 15 18:37:27.527: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] tx ECHO_REQ(tid=4095)
*Jan 15 18:37:27.527: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 36, sending
*Jan 15 18:37:27.527:     UDP src=3000, dst=3000
*Jan 15 18:37:27.527: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=4237)
*Jan 15 18:37:27.531: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=4237)
*Jan 15 18:37:28.531: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=4238)
*Jan 15 18:37:28.531: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=4238)
*Jan 15 18:37:29.531: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=4239)
*Jan 15 18:37:29.531: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=4239)
*Jan 15 18:37:30.527: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] tx ECHO_REQ(tid=4096)
*Jan 15 18:37:30.527: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 36, sending
*Jan 15 18:37:30.527:     UDP src=3000, dst=3000
*Jan 15 18:37:30.531: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=4240)
*Jan 15 18:37:30.531: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=4240)
*Jan 15 18:37:31.531: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=4241)
*Jan 15 18:37:31.531: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=4241)
*Jan 15 18:37:31.767: ISDN Se0:23 SC: TX ->  INFOc sapi = 0  tei = 0
ns = 0  nr = 0  i = 0x430200000A6808C000000000000000
*Jan 15 18:37:31.767: ISDN Se0:23 SC: RX <-  RRr sapi = 0  tei = 0  nr = 1
*Jan 15 18:37:31.783: ISDN Se0:23 SC: RX <-  INFOc sapi = 0  tei = 0  ns = 0
nr = 1  i = 0x430280000A6808C000000000000000
*Jan 15 18:37:31.783: ISDN Se0:23 SC: TX ->  RRr sapi = 0  tei = 0  nr = 1
*Jan 15 18:37:31.783: ISDN Se0:23 SC: TX ->  INFOc sapi = 0  tei = 0  ns = 1
 nr = 1  i = 0x43020000066660500FFFFFF00
*Jan 15 18:37:31.787: ISDN Se0:23 SC: RX <-  RRr sapi = 0  tei = 0  nr = 2
*Jan 15 18:37:31.803: ISDN Se0:23 SC: RX <-  INFOc sapi = 0  tei = 0  ns = 1
nr = 2  i = 0x430280000B660500FFFFFF00
*Jan 15 18:37:31.803: ISDN Se0:23 SC: TX ->  RRr sapi = 0  tei = 0  nr = 2
*Jan 15 18:37:33.527: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] tx ECHO_REQ(tid=4097)
*Jan 15 18:37:33.527: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 36, sending
*Jan 15 18:37:33.527:     UDP src=3000, dst=3000
*Jan 15 18:37:33.535: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=4242)
```

```
*Jan 15 18:37:33.539: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=4242)
*Jan 15 18:37:34.539: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=4243)
*Jan 15 18:37:34.539: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=4243)
*Jan 15 18:37:35.283: ISDN Se0:23 SC: RX <-  INFOc sapi = 0  tei = 0
ns = 2  nr = 2  i = 0x43020000086705000000000
*Jan 15 18:37:35.283: ISDN Se0:23 SC: TX ->  RRr sapi = 0  tei = 0  nr = 3
*Jan 15 18:37:35.283: ISDN Se0:23 SC: TX ->  INFOc sapi = 0  tei = 0
ns = 2  nr = 3  i = 0x43028000096705000000000
*Jan 15 18:37:35.287: ISDN Se0:23 SC: RX <-  RRr sapi = 0  tei = 0  nr = 3
*Jan 15 18:37:36.527: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.132] tx ECHO_REQ(tid=4098)
*Jan 15 18:37:36.527: IP: s=172.16.13.141 (local), d=172.16.13.132
(FastEthernet0), len 36, sending
*Jan 15 18:37:36.527:     UDP src=3000, dst=3000
*Jan 15 18:37:36.539: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] tx ECHO_REQ(tid=4244)
*Jan 15 18:37:36.539: rlm 0: link [172.16.13.141(FastEthernet0),
172.16.13.134] rx ECHO_ACK(tid=4244)
NAS1#
NAS1#undebug all
All possible debugging has been turned off
NAS1#show rlm group 0
RLM Group 0 Status
 User/Port: RLM_MGR/3000 ISDN/3001
 RLM Version : 2
 Link State: Up  Last Link Status Reported: Server_Switched
 !--- Indicates the link change caused by the switch-over. Next tx TID: 2 Last rx TID: 0 Server
Link Group[sc1]: Last Reported Priority: LOW link [172.16.13.141(FastEthernet0), 172.16.13.132]
= socket[standby] Server Link Group[sc3]: Last Reported Priority: HIGH link
[172.16.13.141(FastEthernet0), 172.16.13.134] = socket[active] RLM Group 0 Timer Values
open_wait = 3s force-down = 30s recovery = 12s switch-link = 5s minimum-up = 60s retransmit = 1s
keepalive = 1s RLM Group 0 Statistics Link_up: last time occurred at *Jan 15 18:37:21.767, total
transition=2 avg=01:10:30.132, max=01:10:30.132, min=00:00:00.000, latest=01:10:30.132
Link_down: last time occurred at *Jan 15 17:26:15.635, total transition=1 avg=00:00:36.000,
max=00:00:36.000, min=00:00:00.000, latest=00:00:36.000 Link_recovered: last time occurred at
*Jan 15 18:37:21.767, success=1(100%), failure=0 avg=0.000s, max=0.000s, min=0.000s,
latest=0.000s Link_switched: last time occurred at none, success=0(0%), failure=0 avg=0.000s,
max=0.000s, min=0.000s, latest=0.000s Server_changed: last time occurred at *Jan 15 18:37:21.767
for totally 1 times Server Link Group[sc1]: Open the link [172.16.13.141(FastEthernet0),
172.16.13.132]: last time occurred at *Jan 15 17:26:45.635, success=1(100%), failure=0
avg=3.000s, max=3.000s, min=0.000s, latest=3.000s Echo over link [172.16.13.141(FastEthernet0),
172.16.13.132]: last time occurred at *Jan 15 18:38:17.527, success=4111(99%), failure=15
avg=0.000s, max=0.068s, min=0.000s, latest=0.000s Server Link Group[sc3]: Open the link
[172.16.13.141(FastEthernet0), 172.16.13.134]: last time occurred at *Jan 15 17:26:45.635,
success=1(100%), failure=0 avg=3.000s, max=3.000s, min=0.000s, latest=3.000s Echo over link
[172.16.13.141(FastEthernet0), 172.16.13.134]: last time occurred at *Jan 15 18:38:17.543,
success=4284(99%), failure=1 avg=0.000s, max=0.068s, min=0.000s, latest=0.000s NAS1#show isdn
status
Global ISDN Switchtype = primary-ni
ISDN Serial0:23 interface       rlm-group = 0
        dsl 0, interface ISDN Switchtype = primary-ni : Primary D
         channel of nfas group 0
    Layer 1 Status:
        ACTIVE
    Layer 2 Status:
        TEI = 0, Ces = 1, SAPI = 0, State = MULTIPLE_FRAME_ESTABLISHED
    Layer 3 Status:
        0 Active Layer 3 Call(s)
    Active dsl 0 CCBs = 0
    The Free Channel Mask:  0x80FFFFFF
    Total Allocated ISDN CCBs = 0
```

```
NAS1#
```

确定问题的本质然后离析问题一个特定设备或组件排除故障。请使用这些工具查出问题：

- MML发出命令检索警报报告的，配置，并且执行呼叫跟踪。
- 查看系统日志文件(/opt/CiscoMGC/var/log/platform.log)提示的向问题。
- 打开在PGW2200的**调试**模式某些进程的(例如引擎或ISDN PRI在IP [PRIIP])。
- 请使用刺探者工具到嗅探器在PGW2200和NAS网关之间的IP信息包。

请使用mml命令**rtrv-alms**查看系统体验的所有警报。一个有用的命令使用是**rtrv-alms ： ：**不断地细听报告的任何当前警报的**cont**。多数有用的信息是platform.log文件在/opt/CiscoMGC/var/log/目录里。此文件包含从系统的所有信息。因为此文件也许非常大，请使用unix命令**grep**通过文件搜索和解析。

搜索的关键字排除ISDN和RLM故障是IOCC-PRIIP，是PRIIP的I/O频路控制点。另一个方法将使用**尾标– f platform.log**在/opt/CIscoMGC/var/log/目录里在实时不断地监控出现的所有错误信息。您在调试模式下能设置PGW2200。设置PRIIP进程到调试模式和看起来深到在PGW2200内的信息包流。

您能使用的另一个工具是Cisco刺探者。它能监控(在实时)运行IP的不同种类的协议(例如， RLM、SS7、ISDN和H.225)。它是类似嗅探器被连接以太网段监控所有流量类型。使用Cisco刺探者工具，本文不报道故障检修程序。

这是PGW2200的若干输出示例。在正常运行，有NAS网关和PGW2200之间的恒定的通信。保活信息在PGW2200可以被监控。Enable (event)有的PGW2200 PRIIP进程在调试模式下与mml命令**set-log:prrip-01:debug,confirm**。

```
sc1 mml>rtrv-ne
   MGC-01 - Media Gateway Controller 2002-01-15 21:48:14
M  RTRV
   "Type:MGC"
   "Hardware platform:sun4u sparc SUNW,Ultra-60"
   "Vendor:"Cisco Systems, Inc.""
   "Location:MGC-01 - Media Gateway Controller"
   "Version:"7.4(11)""
   "Platform State:ACTIVE"
   ;
sc1 mml>help:set-log
   MGC-01 - Media Gateway Controller 2002-01-15 21:48:26
M  RTRV



                        SET-LOG -- Set Logging Levels
                        -----------------------------

   Purpose:      This MML command is used to set the logging level of a
                 process or all processes.

   Format:       set-log::
                 set-log:all:

   Input         * proc -- The various actively and passively monitored
   Description:    processes running on the MGC.  Use the RTRV-SOFTW:ALL
                   command to display all processes.

                 * log level -- Sets the logging level for the specified
                   process.  Logging levels are as follows:
```

```
                  -  CRIT  -- Critical level messages.

                  -  ERR   -- Error condition messages.

                  -  WARN  -- Warning condition messages.

                  -  INFO  -- Informational messages.

                  -  TRACE -- Trace messages.

                  -  DEBUG -- Debug-level messages (lowest level). A CONFIRM
                              parameter is required for the DEBUG log level.
sc1 mml>rtrv-softw:all
   MGC-01 - Media Gateway Controller 2002-01-15 21:49:00
M  RTRV
   "CFM-01:RUNNING ACTIVE"
   "ALM-01:RUNNING ACTIVE"
   "MM-01:RUNNING ACTIVE"
   "AMDMPR-01:RUNNING ACTIVE"
   "CDRDMPR-01:RUNNING ACTIVE"
   "DSKM-01:RUNNING IN N/A STATE"
   "MMDB-01:RUNNING IN N/A STATE"
   "POM-01:RUNNING ACTIVE"
   "MEASAGT:RUNNING ACTIVE"
   "OPERSAGT:RUNNING ACTIVE"
   "PROVSAGT:RUNNING ACTIVE"
   "priip-1:RUNNING IN N/A STATE"
!--- This is the process which is set !--- to debug mode. "Replic-01:RUNNING ACTIVE" "ENG-
01:RUNNING ACTIVE" "IOCM-01:RUNNING ACTIVE" "TCAP-01:RUNNING IN N/A STATE" "ss7-a-1:RUNNING IN
N/A STATE" "FOD-01:RUNNING IN N/A STATE" "LOG-01:RUNNING IN N/A STATE" ; sc1 mml>set-log:priip-
1:debug,confirm
!--- MML command for PRIIP process !--- in debug mode. MGC-01 - Media Gateway Controller 2002-
01-15 21:49:30 M COMPLD "priip-1" ; sc1 mml>quit
```

这里，正常RLM保活信息被交换在NAS网关和PGW2200之间。

```
sc1% tail -f platform.log
!--- UNIX command used to monitor messages logged !--- to the platform.log file. !--- UPD Srv is
the ECHO_REQ received from the !--- NAS gateway on UDP port 3000. !--- IoSendUdp is the ECHO_ACK
sent back from the PGW 2200 to the !--- NAS gateway on UDP port 3000. Tue Jan 15 21:49:41:149
2002 | priip-1 (PID 18408) <Debug> UDP Srv (ff100001) 8 bytes 172.16.13.141:3000 !--- ECHO_REQ
received from the NAS gateway (172.16.13.141). !--- Note the Hex dump (02 05 00 08 38 2c 00 01)
!--- 02 = RLM version 05 = echo_req 00 08 = packet length 0x382c = tid. Tue Jan 15 21:49:41:149
2002 | priip-1 (PID 18408) <Trace> PROT_TRACE_RLM_PDU: Hex dump of RLM messages ff100001 0
(8) 02 05 00 08 38 2c 00 01
Tue Jan 15 21:49:41:149 2002 | priip-1 (PID 18408) <Debug>
ioSendUdp: Server  fd 8 Dsl 0 IP 172.16.13.141:3000
 !--- ECHO_ACK sent back from PGW 2200 to the NAS gateway. !--- Note the Hex dump (02 06 00 08
38 2c 00 02) !--- 0x02 = RLM version 0x06 = echo_ack 0x0008 = packet length 0x382c = tid. Tue
Jan 15 21:49:41:149 2002 | priip-1 (PID 18408) PROT_TRACE_RLM_PDU: Hex dump of RLM messages
ff100001 1 (8)
02 06 00 08 38 2c 00 02
```

此输出是在NAS网关和PGW2200之间的正常ISDN保活信息。

```
!--- UPD Srv is the ISDN RRp keepalive !--- received from the NAS gateway on UDP port 3001. !---
IoSendUdp is the ISDN RRf keepalive sent back from the PGW 2200 !--- to the NAS gateway on UDP
port 3001. Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv (00100001) 4 bytes
172.16.13.141:3001
```

```
Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408) <Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0 (4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408) <Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408) <Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408) <Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1 (4) 00 01 01 0b
```

这是异常ISDN信令示例。Keepalive没有由PGW2200接受从NAS网关。

```
!--- UPD Srv is the ISDN RRp keepalive !--- received from the NAS gateway on UDP port 3001. !--- IoSendUdp is the ISDN RRf keepalive sent back from the PGW 2200 !--- to the NAS gateway on UDP port 3001. Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv (00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408) <Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0 (4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408) <Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408) <Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408) <Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1 (4) 00 01 01 0b
```

此部分是PGW2200的**调试**捕获，当D信道忆起在职时(未关闭)。

Note: 备注被编号，在对应的调试的一个参考在NAS网关。

PGW2200调试

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
```

```
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
```

```
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001
```

```
Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
```

```
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001
```

```
Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
```

```
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
```

```
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]
```

```
Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

```
!--- UPD Srv is the ISDN RRp keepalive !--- received
from the NAS gateway on UDP port 3001. !--- IoSendUdp is
the ISDN RRf keepalive sent back from the PGW 2200 !---
to the NAS gateway on UDP port 3001. Tue Jan 15
23:05:32:890 2002 | priip-1 (PID 18408) <Debug> UDP Srv
(00100001) 4 bytes 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 0
(4) 00 01 01 0b

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
[ LINK 1 24 0 STATE 3 EVENT RR ]

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Debug>
ioSendUdp: Server  fd 9 Dsl 1 IP 172.16.13.141:3001

Tue Jan 15 23:05:32:890 2002 | priip-1 (PID 18408)
<Trace>
```

```
PROT_TRACE_Q921_PDU: Hex dump of Q921 messages 100001 1
(4) 00 01 01 0b
```

此命令输出是从NAS边输出的前面的命令的重复项。注意对应的被编号的备注。

NAS

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
```

```
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
```

```
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```


```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```


```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```


```
NAS1#show debug
```

```
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
```

```
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
```

```
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -
```

```
  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
```

```
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -
```

```
NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

```
NAS1#show debug
ISDN:
  ISDN Q921 packets debugging is on
  ISDN Q931 packets debugging is on
  ISDN Q921 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

  ISDN Q931 packets debug DSLs. (On/Off/No DSL:1/0/-)
  DSL  0 --> 7
  1 - - - - - - -

NAS1#configure terminal
```

```
Enter configuration commands, one per line.  End with
CNTL/Z.
NAS1(config)#interface s0:23
NAS1(config-if)#no shut
NAS1(config-if)#
Jan 16 17:02:45.310: %CSM-5-PRI: add PRI at slot 0, unit
0, channel 23 with index 0
Jan 16 17:02:47.310: %LINK-3-UPDOWN: Interface
Serial0:23, changed state to up
Jan 16 17:02:47.310: ISDN Se0:23 SC: TX ->  SABMEp c/r =
0 sapi = 0  tei = 0
 !--- 1. The NAS tries to re-establish the ISDN link.
Jan 16 17:02:47.314: ISDN Se0:23 SC: RX <- UAf c/r = 0
sapi = 0 tei = 0
```

RESYNC_REQ/RESYNC_RESP

RESYNC_REQ/RESYNC_RESP消息使用到检查点在PGW2200和NASes之间的呼叫状态。这些消息典型地生成，在一个转换事件确定后任何差误是否在呼叫状态发生了。这些消息用于重建信道呼叫状态的一张统一的视图在PGW2200和NAS网关的防止所有可能的暂停CIC。

组服务消息

类似于再同时消息，组服务消息使用单个消息每D信道指示服务状态(IS/OOS)所有相关的B信道。NAS发起组服务操作。行动在PGW2200边采取维护根据比较每条信道状态的结果的信道状态的一致性。当PGW2200收到此消息时，派出SS7 ISUP电路组块(CGB/CGBA)和电路组取消阻止(CGU/CGUA)对应于从组服务消息的B信道服务征兆。另外，对组服务消息的确认从NAS不发生，直到信令网关从PSTN交换机接受一CGBA或CGUA。

在Cisco SS7互连语音网关解决方案配置，从的承载信道NAS被联接(固定)到SS7持票人。前面，PGW2200引擎处理了每各自的NAS服务消息通过设置承载信道服务状态。当在的许多信道NAS同时时更改状态，发生的服务消息能充斥交换机，如果单个发送他们。从NAS传送的组服务消息高效地通知引擎所有承载信道状态。引擎必须解码此消息，更改每条NI-2承载信道状态和传播对SS7边的更改，必须传送对应的块和取消阻止信道管理信息(CGB/CGBA和CGU/CGUA)。这允许最大效率。此Group Service Message (GSM)帮助使SERVICE/SERVICE ACK消息处理减到最小的数量在超过被采取到在服务范围外或在职的一条信道(或接口情形下)。组服务消息能每次处理三十个接口。

如果遇到任何问题，请收集SS7/NI2+ RLM嗅探器跟踪：

- **收集snoop/NI2+/RLM/-SS7嗅探器跟踪**

此部分列出收集嗅探器跟踪的几个方法。哪个您选择取决于是否安排Cisco分组电话中心监测与排障(PTC-MT)安装您或运行Cisco刺探者旧版本。Cisco刺探者能产生一好了解SS7-SIP呼叫流。

- 您能发出**snoop命令**在所有Solaris平台。登陆作为超级用户并且发出此命令收集UNIX**监听**信息：

  ```
  snoop  -o snoop.log IP address
  Ctrl C     - to exit snoop
  ```

  加载snoop.log文件到案例注释。**Note:** 解释在案例注释此文件通过**snoop命令**使用是获取的UNIX。
- 运行Cisco刺探者应用程序。登陆作为超级用户并且发出**list命令./snooper int接口的PARMS**或运行**./snooper**收集Cisco刺探者信息，给予您一个完整的说明。

  ```
  ./snooper int hme'x' ni2+ rlm ss7  > snooper_int1
  !--- Where 'x' is the interface number, which you can also find !--- by issuing the ifconfig
  ```

```
-a command.
```

加载snooper_int1文件到案例注释。

- 运行PTC-MT。为了收集PTC-MT信息，请登陆作为超级用户并且发出**list命令./ptcmt int接口的PARMS**或运行**./snooper**，给予您一个完整的说明。

```
./ptcmt int hme'x' ni2+ rlm ss7  > snooper_int1
!--- Where 'x' is the interface number, which you can also find !--- by issuing the ifconfig
-a command.
```

加载snooper_int1文件到案例注释。

- 在Cisco IOS NAS上，请发出IOS show isdn status命令、**show rlm group 'x'**和**debug isdn q931**。

PGW2200和NAS故障检修情况

此部分为Cisco PGW 2200提供细节和故障检修情况与Cisco NAS的组合。

以太网和Fast-Ethernet下来在Cisco NAS

发出在Cisco PGW 2200的mml命令**rtrv-alms**发现故障的原因。在此方案中，以太网和Fast-Ethernet下降在NAS主机名- v5300-2。这导致是的'signas1'不可得到的。

```
PGW2200a mml> rtrv-alms
   MGC-02 - Media Gateway Controller 2004-07-29 05:14:38.471 GMT
M  RTRV
   "iplnk1-v5300-2: 2004-07-29 05:06:05.870 GMT,ALM=\"SC FAIL\",SEV=MJ"
   "iplnk2-v5300-2: 2004-07-29 05:05:06.671 GMT,ALM=\"SC FAIL\",SEV=MJ"
   "signas1: 2004-07-29 05:06:05.871 GMT,ALM=\"FAIL\",SEV=MJ"
   ;
PGW2200a mml>
```

在这种情况下Cisco NAS v5300-2的以太网和Fast-Ethernet在关闭模式下，并且两个插槽是闭合的。

```
V5300-2#show
RLM Group 0 Status
 User/Port: RLM_MGR/3000 ISDN/3001
RLM WATCHER:
 RLM Version : 2
 Link State: Down       Last Link Status Reported: Down
 Next tx TID: 0         Last rx TID: 0
 Server Link Group[demask]: Last Reported Priority: LOW
  link [10.48.85.187(FastEthernet0), 10.48.85.24] = socket[closed]
  link [10.48.84.187(Ethernet0), 10.48.84.24] = socket[closed]
 Server Link Group[mgc-bru-3a]: Last Reported Priority: HIGH
  link [10.48.85.187(FastEthernet0), 10.48.85.65] = socket[closed]
  link [10.48.84.187(Ethernet0), 10.48.84.65] = socket[closed]

RLM Group 0 Timer Values
 open_wait  = 3s               force-down  = 30s
 recovery   = 16s              switch-link = 10s
 minimum-up = 60s              retransmit  = 2s
```

```
 keepalive  = 2s
```

您能检查platform.log错误信息在/opt/CiscoMGC/var/log目录里通过unix命令的此。进一步Cisco PGW 2200错误信息信息，请参见日志消息文档。

```
tail -f platform.log
Thu Jul 29 05:27:40:190 2004 GMT | priip-1 (PID 16498) <Error>
PROT_ERR_RLM_DATA_RCV: No data received for RLM link iplnk1-v5300-2[00100001]

Thu Jul 29 05:27:41:060 2004 GMT | priip-1 (PID 16498) <Error>
PROT_ERR_RLM_DATA_RCV: No data received for RLM link iplnk2-v5300-2[00100002]

Thu Jul 29 05:27:43:662 2004 GMT | engine (PID 16491) <Error>
CP_ERR_GET_SIGPATH_FOR_CALLSIDE: cmgProtocolAdapter::newCall:  UCID=00000003,
OSigPath=00150001, OTG=*NA*, OSPAN=*NA*, OTS/CIC=1,
TSigPath=00140001, TTG=*NA*, TSPAN=*NA*, TTS/CIC=0,
: failed to get sigPath for callside 2

!--- Note: OSigPath = 00150001 are the "ss7path". !--- TSigPath=00140001 are the "iplnk1-v5300-
2", "iplnk2-v5300-2" - "signas1"


Thu Jul 29 05:27:43:662 2004 GMT | engine (PID 16491) <Error>
CP_ERR_BC_INSV: cmgProtocolAdapter::setChanAsTermLeg:  UCID=00000003,
OSigPath=00150001, OTG=*NA*, OSPAN=*NA*, OTS/CIC=1,
TSigPath=00140001, TTG=*NA*, TSPAN=0, TTS/CIC=1,
 Bear channel is not inservice

Thu Jul 29 05:31:06:712 2004 GMT | engine (PID 16491) <Error>
CP_ERR_MAN_BC_BLK: cmgProtocolAdapter::setChanAsTermLeg:  UCID=00000004,
OSigPath=00150001, OTG=*NA*, OSPAN=*NA*, OTS/CIC=1,
TSigPath=00140001, TTG=*NA*, TSPAN=0, TTS/CIC=1,
 Bear channel is manual blocked
!--- Note: The RLM link goes down and SS7 - !--- Circuit Group Blocking Message (CBG) !---
messages are sent.
```

在激活链路的IP连通性问题- “链路被恢复的”消息

```
V5300-2#show rlm group 0
RLM Group 0 Status
 User/Port: RLM_MGR/3000 ISDN/3001
RLM WATCHER:
 RLM Version : 2
 Link State: Up         Last Link Status Reported: Up
 Next tx TID: 1         Last rx TID: 0
 Server Link Group[demask]: Last Reported Priority: LOW
  link [10.48.85.187(FastEthernet0), 10.48.85.24] = socket[standby]
  link [10.48.84.187(Ethernet0), 10.48.84.24] = socket[standby]
 Server Link Group[mgc-bru-3a]: Last Reported Priority: HIGH
  link [10.48.85.187(FastEthernet0), 10.48.85.65] = socket[active]
  link [10.48.84.187(Ethernet0), 10.48.84.65] = socket[standby]
```

在这种情况下FastEthernet0是激活链路。然而，在某一瞬间，有IP连通性和电缆问题。这导致在Cisco PGW 2200的此消息patform.log的：

```
V5300-2#show rlm group 0
RLM Group 0 Status
 User/Port: RLM_MGR/3000 ISDN/3001
RLM WATCHER:
 RLM Version : 2
```

```
 Link State: Up         Last Link Status Reported: Up
 Next tx TID: 1         Last rx TID: 0
 Server Link Group[demask]: Last Reported Priority: LOW
  link [10.48.85.187(FastEthernet0), 10.48.85.24] = socket[standby]
  link [10.48.84.187(Ethernet0), 10.48.84.24] = socket[standby]
 Server Link Group[mgc-bru-3a]: Last Reported Priority: HIGH
  link [10.48.85.187(FastEthernet0), 10.48.85.65] = socket[active]
  link [10.48.84.187(Ethernet0), 10.48.84.65] = socket[standby]
```

在IOS网关上，有此消息：

```
V5300-2#show rlm group 0
RLM Group 0 Status
 User/Port: RLM_MGR/3000 ISDN/3001
RLM WATCHER:
 RLM Version : 2
 Link State: Up         Last Link Status Reported: Up
 Next tx TID: 1         Last rx TID: 0
 Server Link Group[demask]: Last Reported Priority: LOW
  link [10.48.85.187(FastEthernet0), 10.48.85.24] = socket[standby]
  link [10.48.84.187(Ethernet0), 10.48.84.24] = socket[standby]
 Server Link Group[mgc-bru-3a]: Last Reported Priority: HIGH
  link [10.48.85.187(FastEthernet0), 10.48.85.65] = socket[active]
  link [10.48.84.187(Ethernet0), 10.48.84.65] = socket[standby]
```

请使用**show rlm group 0命令**查看Ethernet0和发现它当前在激活链路。

```
V5300-2#show rlm group 0
RLM Group 0 Status
 User/Port: RLM_MGR/3000 ISDN/3001
RLM WATCHER:
 RLM Version : 2
 Link State: Up         Last Link Status Reported: Up_Recovered
 Next tx TID: 2         Last rx TID: 0
 Server Link Group[demask]: Last Reported Priority: LOW
  link [10.48.85.187(FastEthernet0), 10.48.85.24] = socket[closed]
  link [10.48.84.187(Ethernet0), 10.48.84.24] = socket[standby]
 Server Link Group[mgc-bru-3a]: Last Reported Priority: HIGH
  link [10.48.85.187(FastEthernet0), 10.48.85.65] = socket[closed]
  link [10.48.84.187(Ethernet0), 10.48.84.65] = socket[active]
```

ios命令**调试rlm第0组**提供细节，当问题出现时。

```
V5300-2#debug rlm group ?
  <0-255>  rlm group number
  event    debug rlm event
  packet   debug rlm packet
  <cr>
```

```
Jul 18 12:21:19.516: rlm 0: [State_Up, rx ACTIVE_LINK_BROKEN]
over link [10.48.85.187(FastEthernet0), 10.48.85.65]
Jul 18 12:21:19.516: rlm 0: link [10.48.84.187(Ethernet0),
10.48.84.65] tx START_REQ(tid=3)
Jul 18 12:21:19.520: rlm 0: link [10.48.84.187(Ethernet0),
10.48.84.65] requests activation
Jul 18 12:21:19.520: rlm 0: link [10.48.85.187(FastEthernet0),
10.48.85.65] is deactivated
Jul 18 12:21:19.524: rlm 0: link [10.48.84.187(Ethernet0),
10.48.84.65] rx START_ACK(tid=3)
```

```
Jul 18 12:21:19.524: rlm 0: [State_Recover, rx START_ACK]
over link [10.48.84.187(Ethernet0), 10.48.84.65]
Jul 18 12:21:19.524: %ISDN-4-RLM_STATUS_CHANGE: ISDN SC
Se0:15 SC: Status Changed to: Link Recovered.
```

检查Cisco PGW 2200报警状态用**rtrv-alms命令**。

```
PGW2200a mml>rtrv-alms
   MGC-02 - Media Gateway Controller 2004-07-29 06:25:29.451 GMT
M  RTRV
   "iplnk2-v5300-2: 2004-07-29 06:21:26.180 GMT,ALM=\"SC FAIL\",SEV=MJ"
    ;
PGW2200a mml>
```

Related Information

- Cisco PGW 2200软交换技术说明
- 思科信令控制器技术文档
- 语音技术支持
- 语音和统一通信产品支持
- Cisco IP 电话故障排除
- Technical Support & Documentation - Cisco Systems